OLOGY DEPARTMENT

32nd Year

OCTOBER, 1948

RUBBER AGE

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Dixie Clay

NOW COMING FROM A NEW MINE

The same high quality and WHITER in color.

This is the BEST DIXIE CLAY we have ever produced and the supply is good for many years.

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.

✓ R v.64 Oct. 1948 - March 1949

There's a Du Pont blowing agent for every requirement

● **UNICEL** — *an elastomer-soluble, organic blowing agent for closed-cell sponge.*

Effective and economical, Unicel may be perfectly dispersed because of its solubility in elastomers. Differences in plasticity of the rubber used have little or no effect on the density of Unicel blown sponge, thus making quality control easier and decreasing breakdown requirements. Sponge blown with Unicel is characterized by small, uniform cell structure. Unicel is not recommended for the manufacture of items where discoloration of sponge or staining of lacquers and enamels cannot be tolerated.

● **UNICEL ND** — *A non-discoloring, elastomer-soluble, organic blowing agent for closed-cell sponge.*

For applications requiring non-staining, non-discoloring sponge, Unicel ND has outstanding advantages. Soluble in elastomers, Unicel ND disperses perfectly. During cure it develops high blowing pressure, minimizing the effect of plasticity variations in the rubber . . . and often makes possible a saving in rubber breakdown time. The uniform, small cell structure typical of Unicel is also obtained with Unicel ND. *And sponge vulcanizates blown with Unicel ND will not discolor or stain lacquer and enamel finishes under most service conditions.*

● **UNICEL S** — *Finely ground sodium bicarbonate dispersed in an oil base for open-celled sponge.*

An odorless, non-staining and non-discoloring blowing agent, Unicel S has **all** the advantages of ordinary sodium bicarbonate, **and in addition,** it may be used in many applications where ordinary soda is not acceptable. Unicel S is thoroughly and easily dispersed in elastomers because the active ingredient is finely ground and dispersed in an oil base. Compared with ordinary soda, much smaller amounts of Unicel S, less stearic acid or other acidic materials are required. Because Unicel S decomposes completely during cure, *there is little or no residue of sodium carbonate in the finished sponge.*

Tune in to Du Pont "Cavalcade of America," Monday Nights—NBC Coast to Coast

For technical literature and samples write to: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Div. Wilmington 98, Delaware.

DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

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BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

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TWO NEW HYCAR AMERICAN RUBBERS

Hycar OR-25 EP *(Easy Processing)*
Hycar OR-25 NS *(Non-Staining)*

HERE are two new American rubbers, both with superior processing characteristics. Hycar NS and Hycar EP differ only in that a special anti-oxidant has been used in the NS, making it non-staining and non-discoloring. This is an outstanding quality, particularly desirable in the fabrication of light colored products. The new Hycar rubbers have all these advantages over the regular process Hycar OR-25:

1. They band on the processing mill speedily—cut mill mixing time.
2. Better extrusion characteristics—less nerve and less heat build-up.
3. Excellent high temperature mixing.
4. Better fusion and mold flow characteristics.
5. Increased building tack for laminated products, such as frictioned stocks and calendered sheeting.

Both rubbers retain those properties which make Hycar American rubbers so usable for so many products . . . permanent resiliency and superior resistance to oil, abrasion, and aging. Ask your supplier for parts made from Hycar. Or write to Dept. HB-10, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
A DIVISION OF THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

OFF FOR A TOUCHDOWN with PHILBLACK O!

Practically an All-American team by himself! Here's what Philblack O, a versatile HAF (High Abrasion Furnace) black, can do! In your line-up as guard . . . he will protect your rubber products from *abrasion*. Place him in your compound as a blocking back . . . to run interference against *cut and crack* growth. Let him carry the ball for a good gain in *flex life!* Yes, and Philblack O can also score with *low heat build-up*.

Give this wonder black a chance to show you what he can do for your line-up of rubber products!

PHILLIPS PETROLEUM COMPANY

Rubber Chemicals Division

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

Watasnal Plastic Fabric by Harte & Company, Inc.

THIS could be a "cold" kitchen, but it isn't. All those gay, colorful decorations help to warm it up—and they also demonstrate the beautifying and practical characteristics of film made from Geon polyvinyl resins.

The bright shade at the window shows how this film takes to clear, high colors. The apron, curtains and the checked tablecloth are an example of the infinite variety of prints to be obtained. Even the covers for the bowl and mixer have special advantages.

For the Geon resins have been formulated in this film to be remarkably kitchen-proof. The film can be cleaned with a damp cloth, is waterproof and tough. Though soft and flexible, it resists wear.

The ideas we talk about here may give you some others—and you needn't limit yourself to kitchens. Geon can be molded, extruded, or used as an impregnant for paper or textiles.

We make no finished products from Geon—or from other B. F. Goodrich Chemical Company raw materials. However, we'll be glad to work with you on any special problems or applications. For more information, write B. F. Goodrich Chemical Company, Dept. R-10, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company

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GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD-RITE AND VULTROL REG. T M U S PAT OFF

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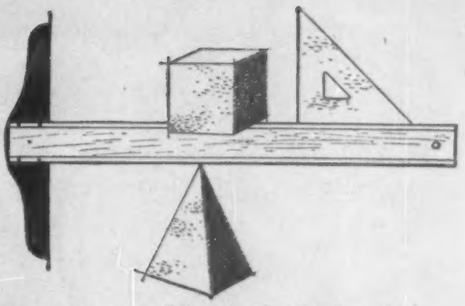
GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals

BROAD TEMPERATURE RANGE... Products made from Marvinol show less heat deformation . . . offer positive advantages in low temperature flexibility.



GREATER STABILITY... Marvinol vinyl resins have a high degree of dimensional stability in processing and in end product. They offer superior resistance to heat, light and other normally destructive factors.

Specify MARVINOL®, The First Vinyl Resin Designed for Modern, High-Speed Plastics Equipment

UNIQUE VERSATILITY... Readily handled, Marvinol resins may be calendered, extruded, injection molded, used in non-aqueous dispersions, formulated as unplasticized rigids. Products based on Marvinol can be transparent, delicately or brilliantly colored.

EXTRA TOUGHNESS . . . High molecular weight gives Marvinol extra toughness, "dryness," long life . . . resistance to oils, acids, foods, aging and wear.

EASILY CLEANED . . . End products made from Marvinol are quickly and easily cleaned.

CLOSE COOPERATION... The Glenn L. Martin Company does not compound or fabricate in the plastics field. Let our trained sales engineers and modern customer service laboratory aid you in your processing problems. Marvinol is produced in the world's most modern chemical plant to assure uniform product of highest quality. Write on your company letterhead to: Chemicals Division, Dept. R-10, The Glenn L. Martin Company, Baltimore 3, Maryland.

Martin

Marvinol

RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF
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"BETTER PRODUCTS, GREATER PROGRESS, ARE MADE BY MARTIN."

Akron-Standard stock servicers are made in many sizes. Both sets of stock rolls are connected together by chain drive to sprockets from motors mounted on side of frame.

Akron-Standard stock servicer for truck and tractor tire-building machines.

Another Akron-Standard aid to modern, streamlined production—a stock servicer which supplies material to the tire builder without leaving his position (ideal for women operators). It handles plies, chafers, tread and breaker. No placing of fabric in loose liners—no more unnecessary handling anywhere! Uniform tension makes for a uniform product.

The tire builder controls each roll with an index button which operates the motor drive. A limit switch automatically stops the roll. The stock rolls are filled so that each ply comes in proper sequence with the cord angles reversed correctly as applied to the drum. The Akron-Standard stock servicer is ideal for any machine building passenger, truck or tractor tires.

Details. On one side of the upper unit are 12 rolls, six of which carry the self-winding liner and six the stock fabric for the operator. The stock is fed to the rolls at the back. When filled, the turret is turned for the next tire.

Ask for our 40-page Bulletin "A-10", describing this and many other profit-earning types of Akron-Standard equipment.

The Akron Standard Mold Co.

1624 Englewood Avenue — *"The Established Measure of Value"* — Akron 5, Ohio, U. S. A.

This is hard-headed business

ANOTHER REASON FOR GOODYEAR LEADERSHIP

WHEN a couple of charging young gridiron giants go crashing into each other head on, those helmets better be made of stern stuff. Otherwise, somebody could get hurt.

Don't worry about the players you see going into action here. Each is protected by a headgear made of a remarkable new kind of plastic material, developed by Goodyear. This unique product is appropriately called "Tuf-Lite." Despite its light weight, "Tuf-Lite" has terrific impact strength and long life. You can slam one of these helmets down on the hardest floor and it keeps bouncing back for more!

Unlike leather, this new material will not absorb water. It is available in a wide variety of attractive, long-lasting colors. Besides helmets, "Tuf-Lite" is being used in shoulder pads, knee pads and shin guards. It's also used for golf club heads and in other places where high impact strength is essential.

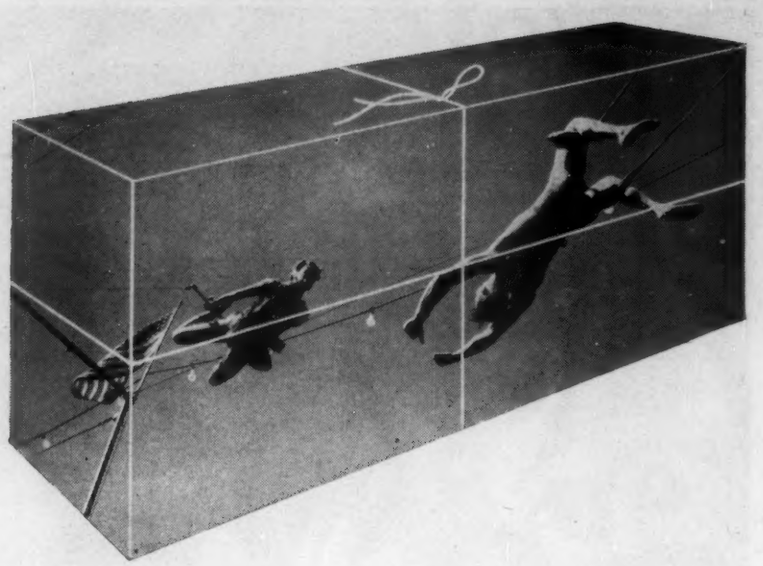
Developing a new plastic material for better sports equipment emphasizes again the sweeping scope of Goodyear activities today. While these activities are found in widely diversified fields, the objective is always the same — *to develop new products that will serve you better.*

For 50 years a leader in rubber, Goodyear also has broad experience with metals, fabrics, plastics, chemicals . . . making sure that all Goodyear products are better today than they were yesterday, better tomorrow than they are today.

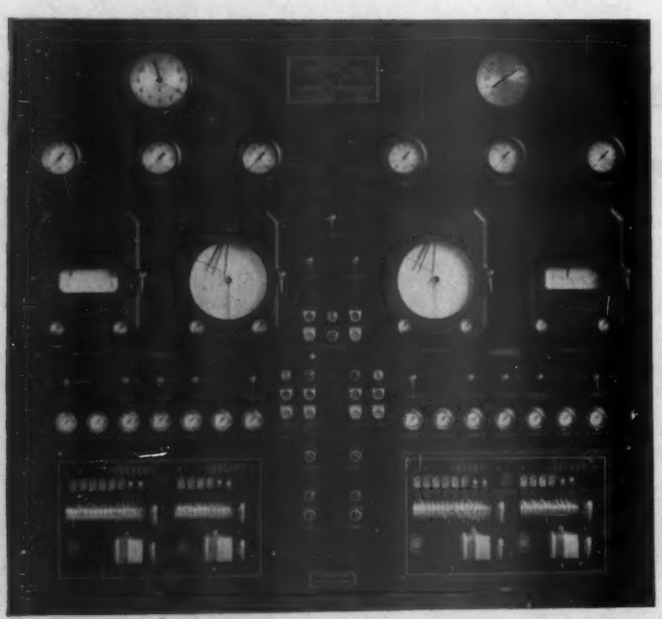
1898 50 GOODYEAR ANNIVERSARY 1948

GOODYEAR

THE GREATEST NAME IN RUBBER



Let us wrap you up a "package" of *Coordinated Control!*



HOW can you beat rising costs—and competition too? Only by turning out a top quality product with a minimum of rejects and re-runs. That also means operating at top efficiency with minimum consumption of steam or other processing media. And it means freeing your operator of responsibility for complicated processing techniques—many of them impossible under manual control. For instance, only occasional supervision is needed even on multiple effect evaporators.

Taylor-engineered Coordinated Control Systems accurately and automatically regulate functions involving sequence and duration of temperature, pressure, humidity, flow and liquid level. Processes like juice evaporation, rubber vulcanizing, starch making, pulp bleaching, cloth dyeing, tobacco tempering, removal of insects from spices and other foods subject to infestation, etc.

How do you get a "package" of Taylor Coordinated Control? First, call in your Taylor Field Engineer. He'll begin by carefully analyzing your problems. Then he'll turn the job over to Taylor Application Engineers—specialists in every branch of instrumentation. Their specialized knowledge will go into the design and assembly of the coordinated control system your specific problems require. You'll receive it complete with all instruments mounted, piped and wired for interlocking or interconnecting with your processing equipment.

Result—with every function of your most complicated process at your fingertips, you'll know it's running at full efficiency. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

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DOUBLE-CHECKED ✓ CHEMICALS FOR THE RUBBER INDUSTRY

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67-1

ZINC DIETHYL
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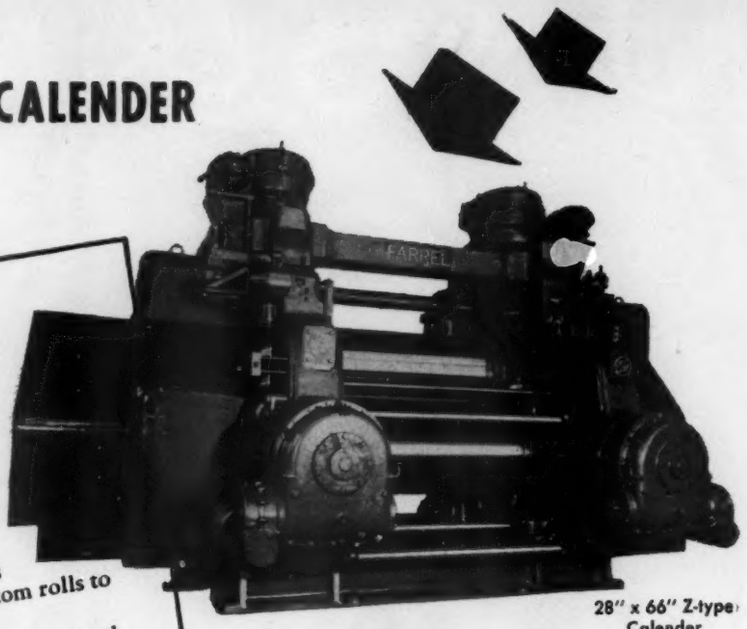
THIS IS PROBABLY THE MOST VERSATILE CALENDER EVER BUILT



28" x 66" Z-type Calender

Special design features permit calendering a wide range of products...to exact gauge ...at best production speeds

This *new* Farrel-Birmingham Z-type calender has a built-in device which provides means for crossing the axes of the two bottom rolls to compensate for roll deflection.

With this device, the amount of the opening created by crossing the roll axes (which is closely equivalent to roll crown) can be varied at will by simply pushing a button. Thus the "crown" can quickly be changed to compensate for the differences in separating force caused by variations in stock composition, gauge and speed. A flat gauge is obtained across the entire width on a variety of stocks, under a wide range of calendering conditions.

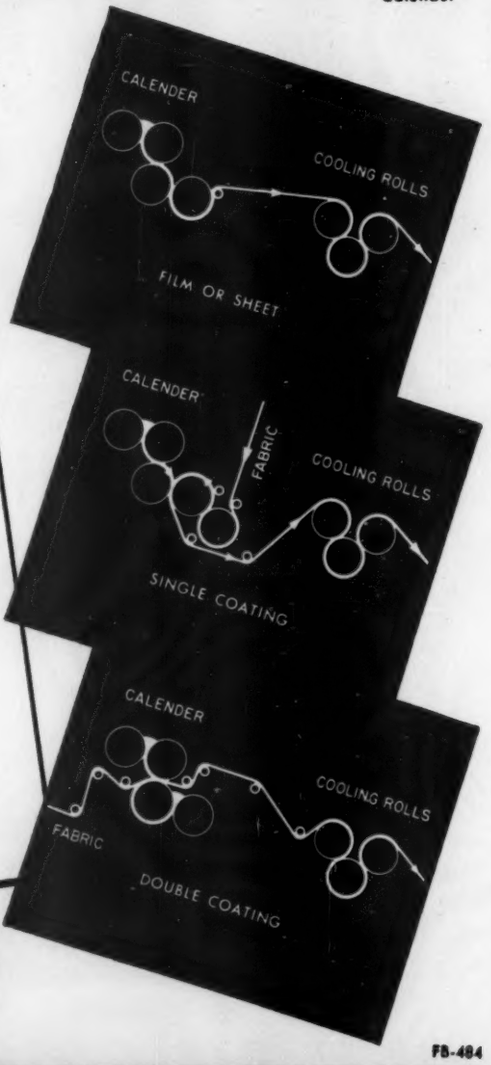
In addition to this "crown" control feature, other innovations that contribute to this calender's unusual performance ability include:

1. "Z" arrangement of rolls. No vertical pressure from a third roll affects roll settings. Exposure of material on any roll surface is limited to a 90° arc.
2. Positive roll positioning by hydraulic preloading devices which anchor the rolls exactly as set.
3. Rolls chamber-bored and drilled under the working surface for most effective temperature control.
4. Improved system of flood-lubrication for roll journals.
5. Drive and connecting gears enclosed in a housing separate from the calender.

Write for further information or engineering assistance.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston



8" x 16" Z-type Laboratory Calender

FB-484

METHOCEL

is back in carload quantities!

Methocel (Dow Methylcellulose) is being successfully employed in the rubber industry as a thickening and creaming agent in rubber dispersions.

Methocel (a cold water soluble cellulose ether) is compatible with a wide range of synthetic latices and with natural latex, and further, can be easily added to these dispersions. Methocel solutions are also very effective rubber mold release agents, where mold temperatures are not excessively high.

Methocel is available for shipment *now*. Take advantage of its unique properties. Write to Dow for more detailed information about Methocel's uses in the rubber industry.

METHOCEL ADVANTAGES

1. Methocel is compatible to an unusual degree with a wide variety of modifying agents including alcohols, wetting agents, plasticizers and resins.
2. Methocel is odorless, harmless.
3. Methocel solutions ordinarily do not require preservatives.
4. Methocel is a uniform, synthetic chemical product.
5. Methocel solutions are neutral.
6. Methocel solutions remain clear and colorless over a wide pH range.
7. Methocel is completely soluble in water.

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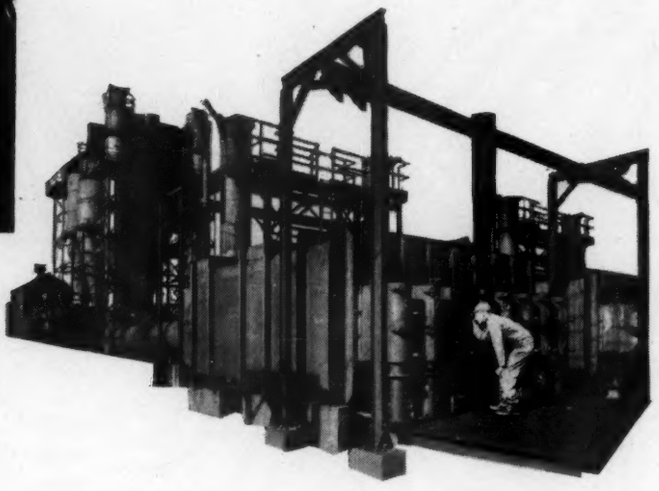
DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

CHANNEL AND FURNACE BLACKS

...to meet your needs

Night and day millions of tiny flames deposit carbon upon steel channels to produce Continental channel blacks.



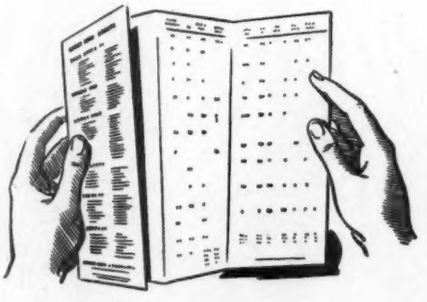
Carefully controlled burning conditions in furnaces such as these insure uniformly high quality Continex furnace blacks.

Continental Carbon Company manufactures a complete line of high quality carbon blacks to meet the most exacting requirements of the rubber, paint, ink, plastics, paper and other industries. In every important classification of channel or furnace black. there is a Continental or Witco product at your service.

Samples of Witco and Continental carbon blacks are available for evaluation by your own technical staff. The new data sheet offered below will help you in requesting the samples suited to your needs.

New Data Chart on Continental & Witco Carbon Blacks...

Send for the quick reference chart of leading carbon blacks and their important properties. It will save you time and assist you in selecting carbon blacks for your specific requirements.



CONTINENTAL CARBON COMPANY **WITCO CHEMICAL COMPANY**

CONTINENTAL CHANNEL AND FURNACE BLACKS

295 MADISON AVENUE, NEW YORK 17, N. Y.

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Some of the Industries Now Served by the Combined Companies

Coatings
Printing Ink
Floor Coverings
Plywood
Paper
Rubber
Plastics
Water Conditioning
Chemical Processing
Pharmaceutical
Textile
Leather
Agricultural and Sanitary Chemicals

The Resinous Products & Chemical Company is now The Resinous Products Division of Rohm & Haas Company, a merger which further strengthens the close bonds which have always existed between the two companies. No change in company policies will result from this joining of forces; the officers and executives of both companies who have worked together throughout the past 22 years will remain in their present functions.

In 1926, when The Resinous Products & Chemical Company was founded, the fields of activities of the companies were quite distinct and their separate existence permitted the fullest cooperation. But, as the companies grew with the expanding synthetic resin and plastic industry, it became apparent that the best interests of our customers would be served by combining the two organizations.

The customers of both companies will benefit from the coordinated laboratory program, the simplification of production, and other economies afforded by the joining of the two organizations. We are confident that the consolidation will enable us to serve our customers still more efficiently in the years to come.

All correspondence should now be directed to Rohm & Haas Company, The Resinous Products Division, Washington Square, Philadelphia 5, Pa.

RECIPE

(Test No. 8401—LSK from the Barrett Rubber Research Laboratory)

FOR

GR-S NON-BLACK COMPOUND

of 55 Shore A Durometer Hardness for

Tubing and other Extruded Goods

Recipe	Weight Basis
GR-S 17 (Non-Staining)	100.00
CUMAR Resin, EX Grade*	25.00
"ATOMITE"	25.00
Clay (Hard)	25.00
"SILENE" EF	25.00
Zinc Oxide	5.00
Red Oxide	5.00
Stearic Acid	2.00
"SUNPROOF"	2.00
Sulfur	4.00
"L-60"	1.50
DOTG	0.75
Total	**220.25**
Mooney Viscosity, ML, 212 F. at 4 Minutes	51
Specific Gravity	1.29
Rubber Hydrocarbon, % by Weight	45.4
Rubber Hydrocarbon, % by Volume	63.8
Scorch Test Data at 250 F. (Small Rotor)	
Mooney Viscosity at 1 Minute	26
Mooney Viscosity at 10 Minutes	21
Mooney Viscosity at 20 Minutes	21

Cure at 316 F. (70 lb.)—15 Minutes

Tension and Hardness Data:	Unaged	Aged 24 hours at 100 C.
Stress at 300%, psi.	350	550
Tensile, psi.	1350	1200
Elongation, %	570	480
Hardness, Shore A	55	61
Tear Resistance (Angle Die), Pounds per one inch thickness	85	80
Abrasion Resistance (du Pont), cc. Loss Per Hp-hr.	640	605
Cut-Growth Resistance (De Mattia), Inches per Kilocycle	0.035	0.083
Compression Set (40% Constant Deflection)	39.6	—
Resilience (Yerzley), % Energy Recovery	62.0	67.0
Impact Resilience (G-H) % Rebound	49.1	51.5

● In the design of soft, rubbery compounds that will tube smoothly and rapidly, and that will cure in open steam (no talc) without sagging or deformation, the compounder will find CUMAR* resin, EX grade, to be a serviceable softener. It is exceptionally effective in modifying the nerve of the elastomer, thereby minimizing dimensional changes after extrusion and generally improving processibility. Vulcanizates meet rigid performance and service requirements. When used against colored lacquered and enameled surfaces, the compound described produces no significant contact or migratory stain. In molded as well as extruded goods required by the automotive and aviation industry, in industrial and mechanical items, footwear and drug sundries, and in flooring and matting, CUMAR* resin, EX grade, plays an important role.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Barrett*

*Reg. U. S. Pat. Off.

RUBBER CHEMICALS
Standard of Performance Throughout the World

Calco
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MBT
MBTS
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DPG
DOTG
Accelerator 49
Aero AC 50
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Half a hundred coating and impregnation plants, including some of the world's largest, profitably use IOI coating systems and equipment. The reasons — to those who know Industrial Ovens — are obvious:

- **Sound Engineering**
- **Economical Operation**
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IOI builds coating and impregnating systems for all types of paper, fabric, film and foil processing—in all production ranges.

If you have a problem in this field it will pay you to discuss it with IOI

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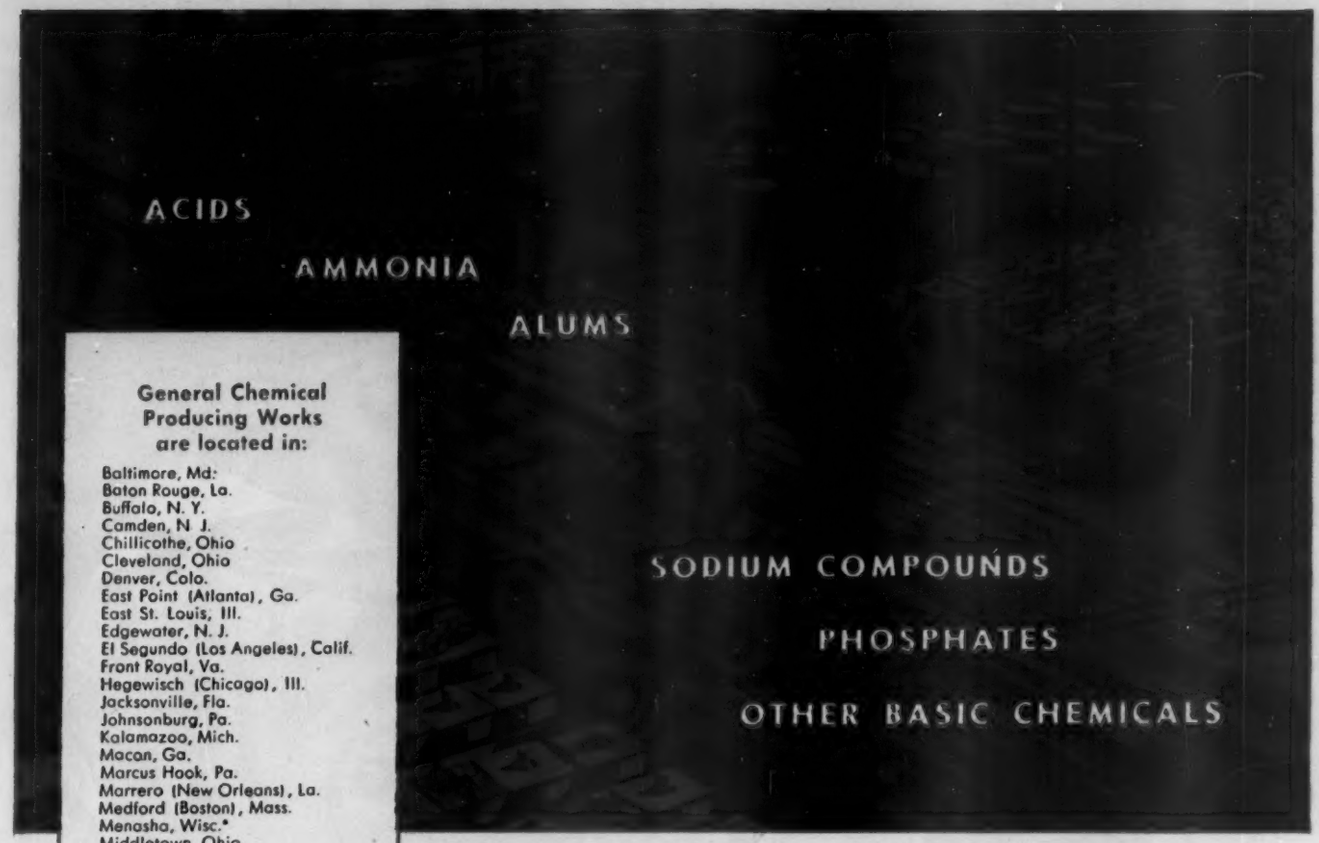
ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON W.1, ENGLAND



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*General Chemical Company, Inc.

BASIC CHEMICALS

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FOR AMERICAN INDUSTRY

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One of these 49 supply centers listed here serves your territory. By taking full advantage of its facilities, you can make it a reliable auxiliary storeroom "right next door to your plant"... ready to fill your regular month-to-month *or emergency* requirements promptly at all times.

Arrange for your requirements now by phoning or writing the nearest General Chemical Office below.

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All Alike at the Start, but...

"DOC" MacGEE SAYS: At the post, every horse looks good . . . equal to his competitors . . . a potential winner. But things happen after the starting bell rings and the barrier goes up. When the race is finally over, only one horse emerges the winner.

You'll find a parallel to this in the field of special industrial naphthas. At first glance, and without detailed investigation, they all seem pretty much alike; one as good as another. And each one finds users who'll either support it fully or be willing to take a chance with it.

But after everything is considered—after the race is run—more and more solvent users are discovering that *only one* solvent — SKELLYSOLVE — is a *consistent* winner. These users know they're not gambling when using SKELLYSOLVE.

It is the outgrowth of years of pioneering in the making of close-cut type naphthas for various industries, begun over 18 years ago, and never ceasing to continue. SKELLYSOLVE is famous for its *unvarying high quality;* it always meets the highest standards. Too, SKELLYSOLVE users know they can always depend on Skelly Oil Company for prompt shipment of every order.

And, when emergencies arise, and unusual problems come up, there is always a staff of SKELLYSOLVE Technical Fieldmen on hand to give competent help.

Yes . . . experience, quality, dependability, and a genuine willingness to serve are what keep SKELLYSOLVE in front. Rely on SKELLYSOLVE in your operations; you'll win every time!

SKELLY

Skellysolve

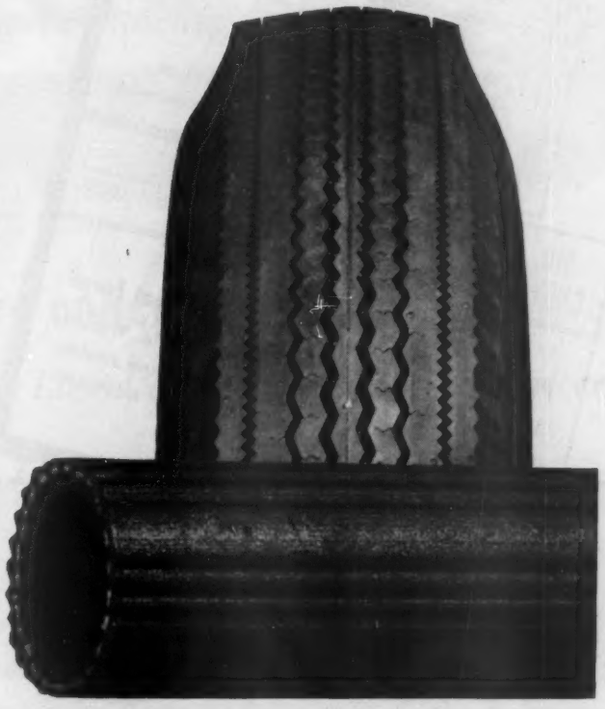
SOLVENTS DIVISION, SKELLY OIL COMPANY, KANSAS CITY, MO.

EL-SIXTY VERSATILE ACCELERATOR FOR ALL RUBBER GOODS

Manufacturers of rubber products ranging from tires, tubes and mechanical goods to the finest of drug sundries will find that El-Sixty* offers them everything they need in an accelerator:

Safe handling
Wide versatility
Good performance in white and colored stocks
Ability to wade through retarding pigments
Excellent in pure gum or reclaim stock
Most stable accelerator in latex—causes no thickening in tanks

El-Sixty can be used alone or activated with Guantal,* Guanidines, Aldehydes, Thiurad,* or Thiurams. For full information, samples and prices, write to MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron 8, Ohio. If you prefer, simply return the coupon. *Reg. U. S. Pat. Off.



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CHEMICALS AND PLASTICS

MONSANTO CHEMICAL COMPANY RA-5
Rubber Service Department
Second National Building, Akron 8, Ohio

Please send me full information ( ); samples of El-Sixty ( ).

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Company_____

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Flash!!

PLAX POLYETHYLENE SOLVES RUBBER BACKING PROBLEMS!

COSTS 50% LESS . . . BOON TO INDUSTRY

Technical DATA

MECHANICAL	Tensile Strength psi	1700-1900
	Flexural Strength psi	1500-1700
	Impact Strength Izod ft lbs/in notch	> 3
	Rockwell Hardness	R-25-R-35
	Elongation %	50-600
PHYSICAL	Specific Gravity	.92
	Specific Volume cu. in/lb.	30.1
	Water Absorption 24 hours. %	< .005-01
	Effect of Sunlight	No discoloration

STD. GAUGES

.001 .0015 .002 .0025 .003

.004 .008 .010 .015 .020 .030

Intermediate Sizes as Requested

PLAX Polyethylene Film Comes in Sheet Form

1000 ft. and 2000 ft. rolls 36" or 40" wide. Wound on 3" cores. Standard colors in opaques and pastels available. Rolls slit to width subject to quotation.

Polyethylene Sheet is Better...Less Expensive! Polyethylene, Backing for Camelback, is a Plax Engineered Product!

This newest plastic development is a revolutionary improvement over products now in use and is employed and endorsed by many of the largest rubber companies in America. With its unique wax-like texture, and resistance to water, acids and alcohol, it is the preferred, highly efficient protection for all types of rubber products. Polyethylene produces a high surface gloss, will not flake or tear, is seamless and of uniform caliper. It's tough, chemically inert, heat-sealable. Excellent for packaging rubber products!

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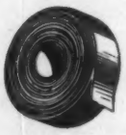

Backing for Friction Tape

Backing for Rubber Materials

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One of the products for the Rubber Industry

from

CADILLAC PLASTIC CO.

651 W. Baltimore • Detroit 2, Michigan

RELEASE MOLDED RUBBER *Economically*

USE COLITE CONCENTRATE... ***A High Quality Concentrated Liquid Mold and Mandrel Lubricant***

- Results in a shiny, satin-like finish.
- Never builds up on the molds.
- Is extremely *economical.*
- Is non-toxic, non-tacky, odorless.

Write today for further information on the Colite Concentrate way of removing cured rubber and plastics from molds

For brighter white goods, **Colite D43D is recommended.**

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How to **WIN** with plastics

A plastics product can only be as good as the plasticizer with which it is compounded. And you *can win* preference for your product through the choice of the right plasticizer.

FLEXOL plasticizers, of which there are now nine, offer plastics and rubber manufacturers wide scope to meet the general requirements of compatibility and non-volatility. In addition, each FLEXOL plasticizer, when compounded with vinyl resins, cellulose derivatives, and rubber, is outstanding in producing one or more special properties — such as low-temperature flexibility, resilience, and non-migration.

Our laboratories have prepared extensive data on the performance of FLEXOL plasticizers. The information is offered to assist you in selecting the *right plasticizer* or combination of plasticizers for your needs. Call or write our nearest office for F-5882, or for samples and prices.

"Flexol" is a registered trade-mark of C&CCC.

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CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities
In Canada:
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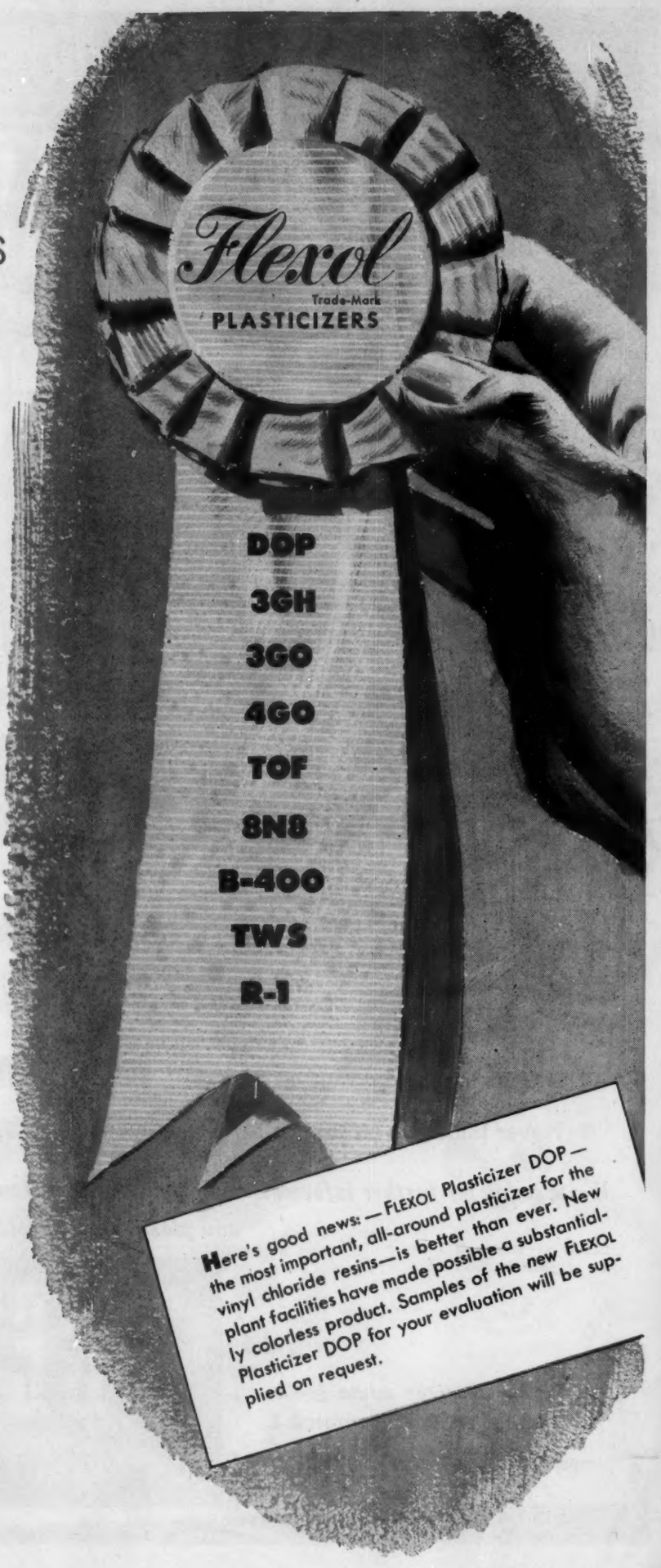
Flexol
Trade-Mark
PLASTICIZERS
DOP
3GH
3GO
4GO
TOF
8N8
B-400
TWS
R-1
Here's good news: — FLEXOL Plasticizer DOP — the most important, all-around plasticizer for the vinyl chloride resins—is better than ever. New plant facilities have made possible a substantially colorless product. Samples of the new FLEXOL Plasticizer DOP for your evaluation will be supplied on request.

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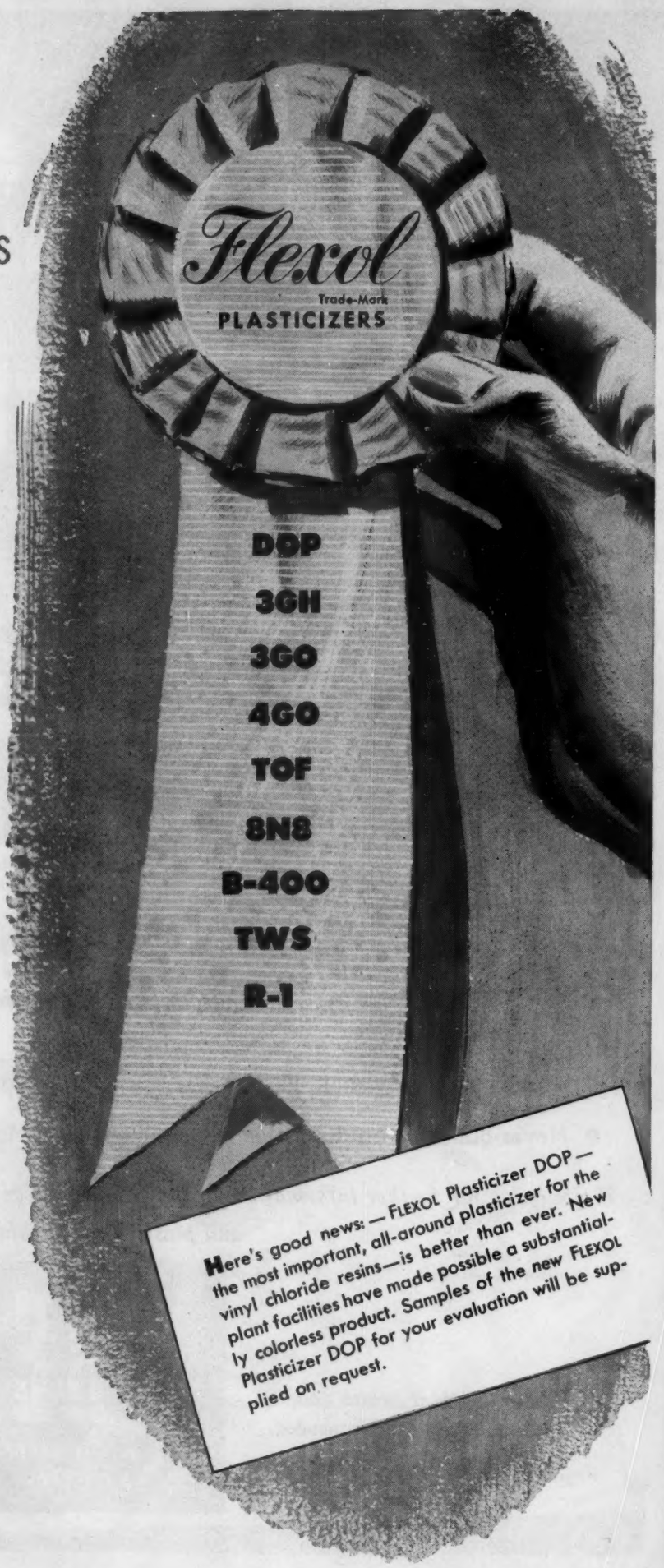
Flexol
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PLASTICIZERS
DOP
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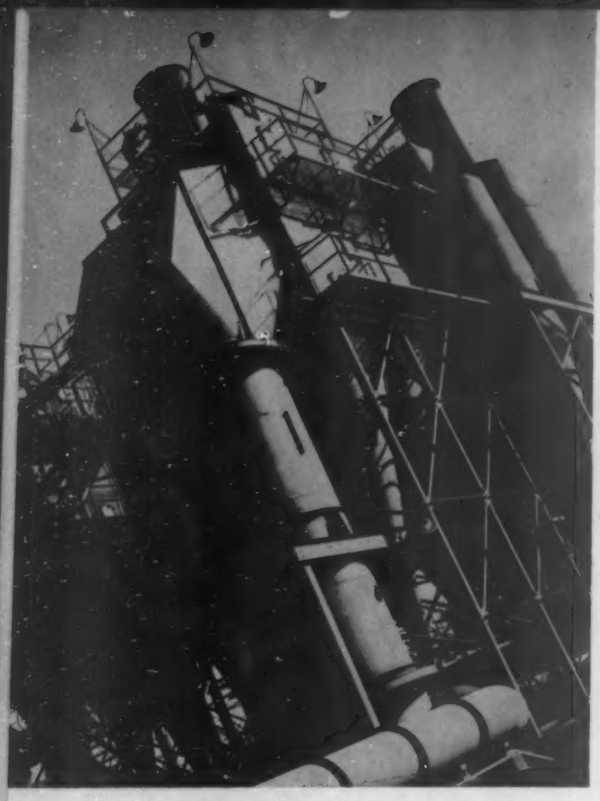

Close-up of coolers, precipitators, and cyclone collectors in one of the twelve units of our furnace black plant at Ryus, Kansas.

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Cool Mixing
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Rapid Extrusion
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Piccolyte

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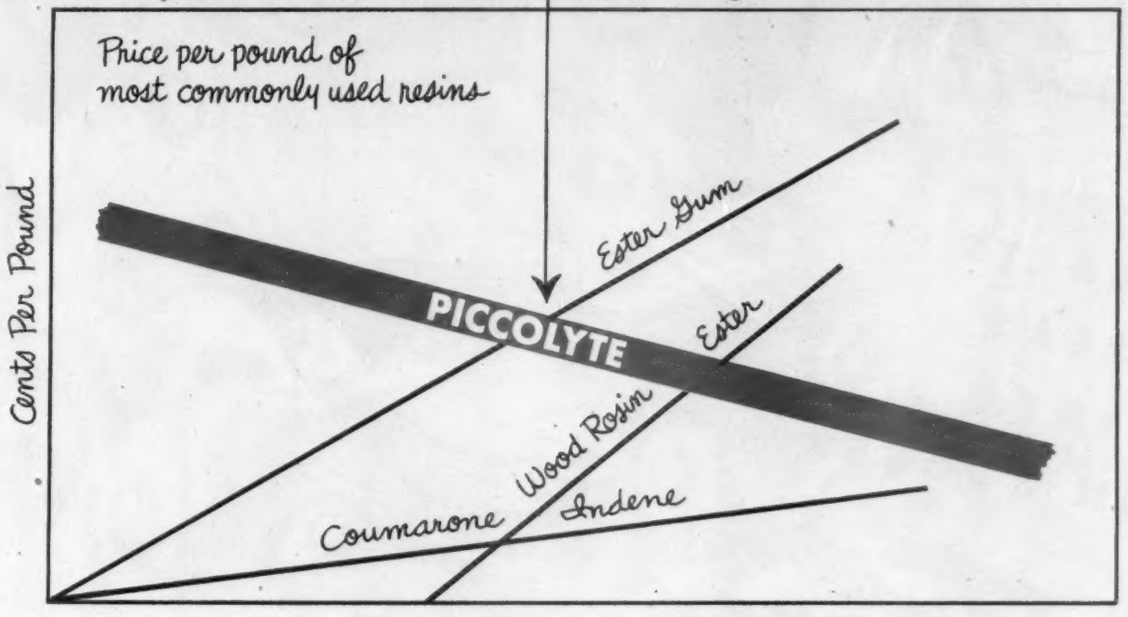
If you require a light colored, low molecular weight softener of hydrocarbon nature . . . investigate PICCOLYTE!



Ideal for EXTENDING, TACKIFYING, CEMENTING

ECONOMICAL. In addition to its low cost per pound, Piccolyte is soluble in low-cost naphthas in all proportions (an important additional source of savings)—as well as in many other solvents.

PALE COLOR, NON-YELLOWING. These very pale, pure hydrocarbon products do not become yellow, but retain their pale color.

PROPERTIES. Piccolyte is a thermoplastic terpene resin, compatible with plantation rubber, many synthetic types including polybutene, and other compounding materials. It is stable, neutral, inert, free from toxicity. Made in nine melting points, from 10° to 125° C. Precision manufacturing control assures dependable uniformity of quality.

Write for free sample of Piccolyte, and complete details, given in the new bulletin. Use the coupon.

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In colored rubber, TITANOX pigments create an enviable clarity of tint that helps your products stand out in competition. The chemical stability and physical inertness of these famous titanium dioxide pigments assure maximum resistance to discoloration of tinted rubber compounds in which they are used.

In white rubber stocks, the TITANOX line imparts a maximum of whiteness, brightness and opacity.

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all the way

SHIPPED THE WAY
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Reduce volume costs

IN NATURAL RUBBER STOCKS—WITH

Calcene T*

Appreciable savings in volume costs in many stocks can be realized through partial or complete replacement of carbon blacks by Calcene T—*with little or no sacrifice in quality*. From this standpoint, Calcene T merits consideration for use in stocks which can be black, as well as for those where color is necessary.

*®

DATA FURNISHED ON REQUEST—Data bearing on the use of Calcene T is contained in Columbia Pigments Data Sheets No. 48-1 and No. 47-6. Just specify by number to Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth at Bellefield, Pittsburgh 13, Pa.

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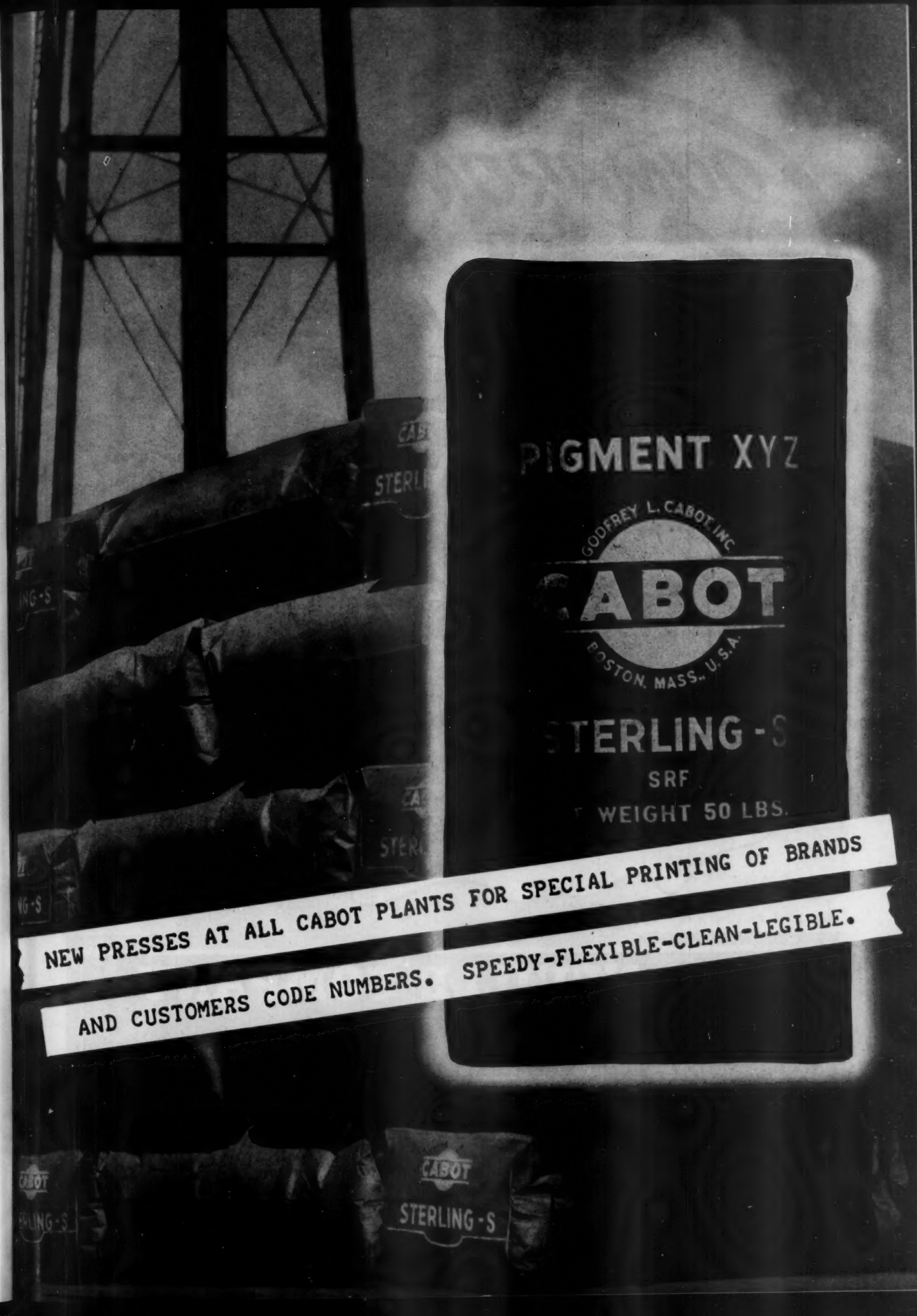

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A-26

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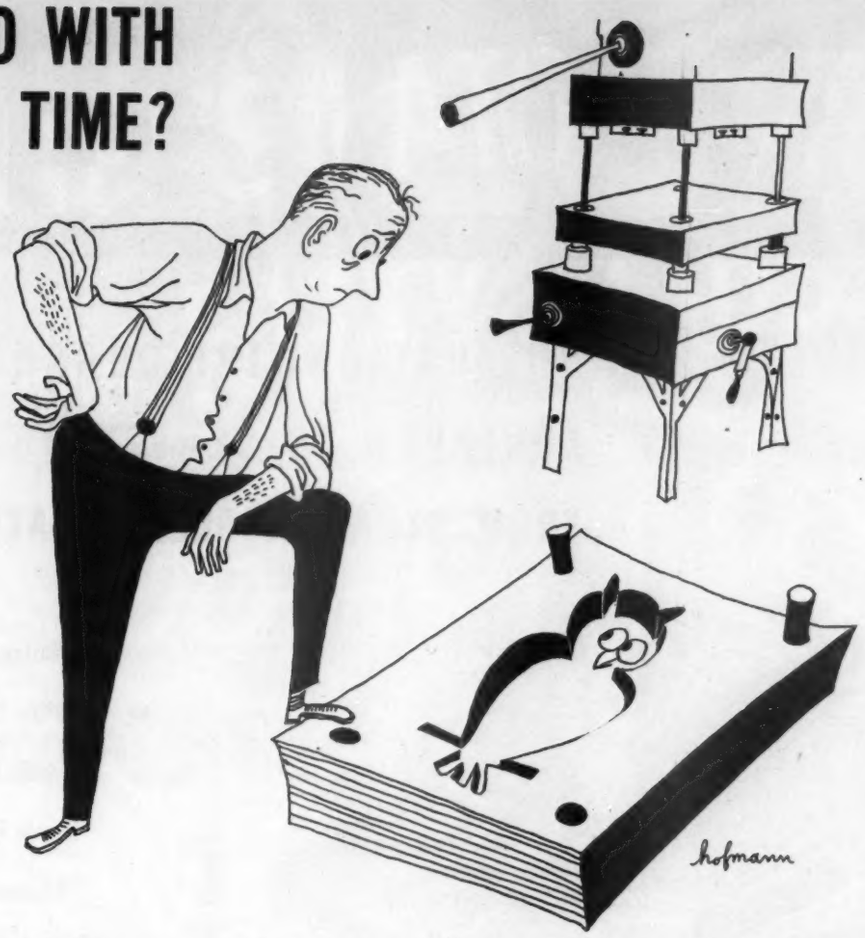
RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

DISGUSTED WITH DOWN TIME?



Time to switch to G-E Silicone Mold Release Agents!

Is your rubber or plastics molding production being held up by too much down time? Then here's the answer to your problem. Switch to General Electric silicones for your mold release agents.

These amazing oils and water-diluted emulsions prevent sticking of binders or molded parts and molds. They penetrate the smallest, most intricate mold cavities with ease. And moreover, they wet mold surfaces readily, because of their relatively low surface tension.

All this adds up to increased production. G-E silicone oils and emulsions do not build up in molds. Thus molds do not need frequent cleaning . . . down time is reduced. In addition, reject losses are cut to the minimum because products are easily released from molds untorn, unscratched.

Order General Electric silicone oil #9981 LTNV-70 (low viscosity), #81092 (high viscosity), silicone emulsion #81024 (75% silicone) or #81099 (35% silicone) in any quantity from pints to drums. Quick delivery. Write for more details. Chemical Department, General Electric Company, Pittsfield, Mass.

Please address inquiries about G-E silicone oils to Resin and Insulation Materials Division, Chemical Department, General Electric Co., Schenectady 5, N. Y.

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GENERAL ELECTRIC

CD48—AH3

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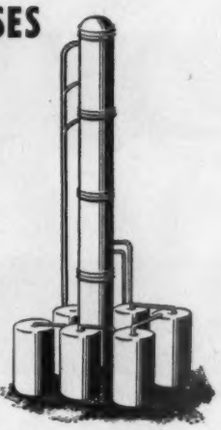
Announcing

SWIFT'S FATS and FATTY ACIDS

for technical uses

Swift & Company is now inviting inquiries on its new lines of fatty acids and fractionated glycerides. Extensive use of solvent processes will make possible new high standards of purity and stability.

1 THE PROCESSES



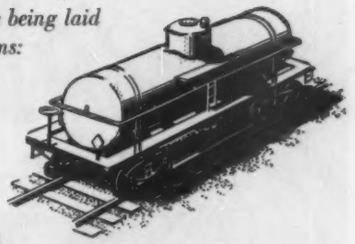
Solvent processes yield fat fractions of higher quality and wider usefulness. Most of Swift's new fats and fatty acids will be processed with solvents.

Unsaturated acids and drying oils will be separated by the Solexol process, using propane as a solvent. Fractions are separated selectively at temperatures not exceeding 200 degrees F. Since thermal and chemical side reactions are thereby avoided, products of greater purity and stability are obtained.

Saturated acids will be fractionated by solvent crystallization. Here, too, processing temperatures are low and harsh catalysts are absent, so that the natural structure of the substances is preserved.

2 THE PRODUCTS

Production plans are being laid for the following items:



Swift's Mixed Fatty Acids
Swift's Cottonseed Fatty Acids
Swift's Animal Fatty Acids
Swift's Linseed Fatty Acids
Swift's Corn Oil Fatty Acids
Swift's Soybean Oil Fatty Acids
Swift's Palm Oil Fatty Acids
Swift's Hydrogenated Marine Oil Fatty Acids

Swift's Fractionated Fatty Acids
Swift's Stearic Acid
Swift's Oleic Acid

Swift's Drying Oils
Swift's Fractionated Sardine Oil
Swift's Fractionated Menhaden Oil
Swift's Fractionated Soybean Oil
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(*now in production*)
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It brings you:

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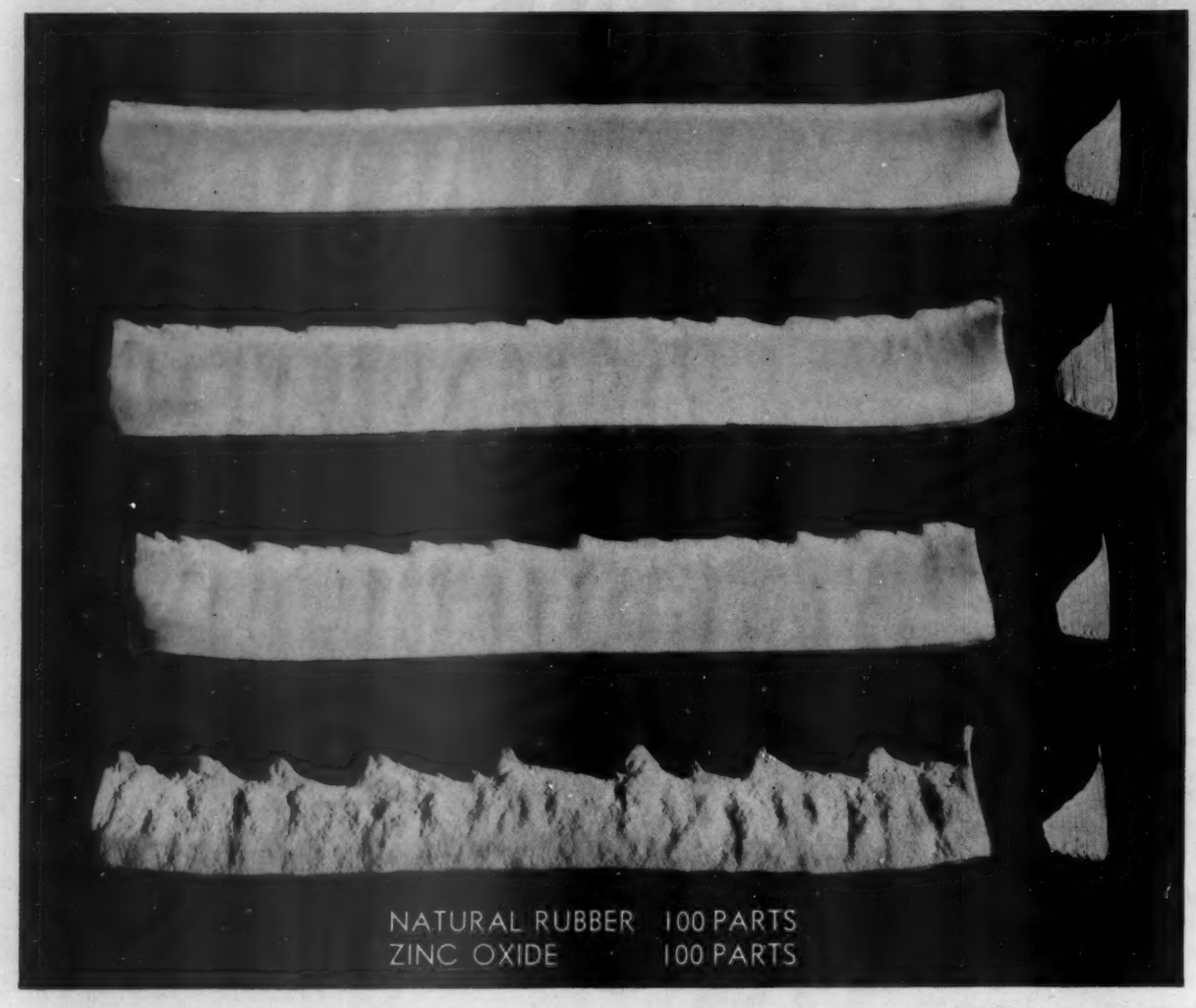
PROTOX-166 ZINC OXIDE*



TUBING CHARACTERISTICS in Natural Rubber

THE tubing characteristics of PROTOX-166 in GR-S were reported in the July, 1948 issue of the Rubber Journals. Results in natural rubber are illustrated in the photograph above. PROTOX-166 is compared with three other brands of untreated Zinc Oxides representing a range in particle size and type of pigment.

In the comparisons, equal parts by weight of Zinc Oxide and natural rubber were compounded under the same conditions. After standing over night the stocks were warmed up, and tubed in the ½ Royle Laboratory Tuber using the Garvey Die. Operating Conditions were as follows: Screw Speed 30 R.P.M.; Cylinder Temperature 75°C; Extension Temperature 55°C; Die Head 75°C.

The superior tubing properties of PROTOX-166 are apparent in the smoothness and conformity with the die.

Why not try PROTOX-166, formerly known as XX-166, in your processing? We'll gladly send you a sample.

U.S. Patents 2,303,329 and 2,303,330

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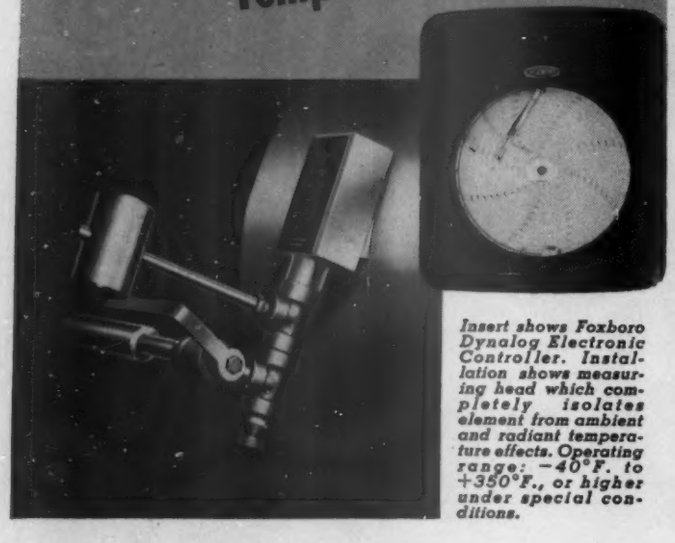
Now!

Continuous Measurement of Roll Surface Temperatures



Insert shows Foxboro Dynalog Electronic Controller. Installation shows measuring head which completely isolates element from ambient and radiant temperature effects. Operating range: −40°F. to +350°F., or higher under special conditions.

A UNIQUE, NEW FOXBORO SYSTEM

for Calender and Mill Rolls

AN ENTIRELY NEW type of measuring head coupled with the sensitive, instantly-responding Dynalog Recorder or Controller solves a tricky problem of long standing. This system is far more accurate than previous devices . . . and much simpler to use.

The Foxboro measuring element is very rugged, yet it bears so lightly (0.75 gm. per sq. cm.) that it avoids any tendency to mark or score the roll. It completely avoids errors due to friction, radiation and convection, as well as the inconveniences, so common to conventional, roll surface temperature bulbs and hand-held surface pyrometers.

Here's the ideal system for measuring or controlling surface temperatures of calender and mill rolls . . . an opportunity to save steam, reduce waste, improve product quality. Write for Bulletin 405. **The Foxboro Company, 256 Neponset Ave., Foxboro, Mass., U. S. A.**

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INDICATING · RECORDING · CONTROLLING

Weathering qualities of RUBBER PRODUCTS determined with reliable accuracy in the

ATLAS *twin arc* WEATHER-OMETER

Any selected cycle of exposure to sunlight and wetting can be set for automatic continuous testing in the Weather-Ometer. Exact tests can be duplicated at any time by settings on the control panel which contains temperature regulator—time meter—light and water cycle switch — automatic cut-off switch — voltage adjusting switch — direct reading thermal regulator — reactance coil (for economical current consumption). The Weather-Ometer is fully automatic in operation; can be left unattended over night; only necessary to renew carbons once in 24 hours. Years of exposure to any conditions of weathering reduced to a few days testing in the laboratory with the Weather-Ometer.

Originators and sole manufacturers of accelerated testing machines for over a quarter of a century. Fade-Ometer, Weather-Ometer, Launder-Ometer — the accepted standard testing machines used all over the world.

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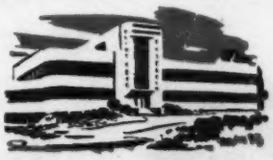

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VOLUME 64
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RUBBER AGE

Vol. 64, No. 1 OCTOBER, 1948

Measurement of Hysteresis and Dynamic Elastic Modulus of Textile Yarns and Cords

By G. PALANDRI

Research Department, Pirelli S. p. a., Milan, Italy

A brief review of the few known test methods employed to measure dynamic modulus and hysteresis losses of textile fibers is given.

A new test method based on forced resonance oscillation is described, in which cords and yarns stretched by a permanent static load are deformed in tension at frequencies of 20 to 200 cycles/sec., with dynamic tension strain of 0.02 to 0.8% and at temperatures of 20° C. to 65° C. Experimental results obtained on cords and equivalent compositions of single yarns are presented and discussed.

Hysteresis losses are found to follow the quadratic law versus dynamic tension strain, and the dynamic modulus E is found to be independent of tension strain in the case of continuous or long fibers. With short fiber textiles, on the other hand, the dynamic modulus E decreases with increasing dynamic tension strain.

The dynamic modulus E is found to be independent of frequency in the examined range above 100 cycles/sec., while the hysteresis losses increase proportionally with the frequency.

Comparative data of the hysteresis losses and modulus of textile fibers most commonly used, with reference to their practical application, are presented.

THE use of textile cords in products such as pneumatic and solid tires and transmission belts, all of which are subject to rapid and repeated flexures, has led to the development of various methods for testing the elastic properties of these materials. The use of synthetic rubbers, all of which possess a greater hysteresis defect than natural rubbers, and therefore transform a greater percentage of deformation energy into heat, has increased the importance of the study of the influence of textile fibers on heat generated by hysteresis.

Meyer and Lotmar *(1)* and Ballon and Silverman *(2)* have measured the elastic modulus (Young's) of synthetic filaments and films by using sound-velocity methods at acoustical frequencies. Wakeham and Honold *(3)* have studied the elastic modulus, and also the effect of hysteresis, in cotton, rayon, and nylon tire cords under dynamic conditions but at relatively low frequencies (1 cycle/sec.). Lyons and Prettyman *(4)* have made exploratory studies for measuring the dynamic modulus and internal frictional properties (hysteresis) of tire cords made of cotton, rayon and nylon in the sonic and near-sonic range, by means of a method employing forced vibrations applied longitudinally to the cords by electro-magnetic means at frequencies of about 100 cycles/sec.

We give herewith a description of a new test method developed by the Pirelli Research Laboratories in 1943, together with some of the results obtained on different kinds of natural and synthetic single yarns and tire cords.

Test Method

The test method used is that of forced oscillations at resonance, the samples being submitted to periodical tension stresses in an electrically-driven apparatus. Under normal conditions the deformation amplitudes are generally small, but they become considerably larger when operating at critical conditions of resonance. This system, which employs forced oscillations tuned to resonance to the yarn or cord mass system, has proved to be very practical for the determination of hysteresis losses and dynamic elastic modulus.

The apparatus now being used in the Pirelli Research Laboratories is schematically shown in Fig. 1, a photograph being given in Fig. 2. It has been found necessary to use a very strong, round bronze plate (8) to fix the sample during test, thus avoiding mechanical deformations of the apparatus itself which would influence the correct elongation measurement of the sample. Four yarns or cords, knotted and bent ring-wise (1), are fixed to the grooved pins (2) set on a movable crossarm (6), and are stretched on pulleys (5) by weights (4).

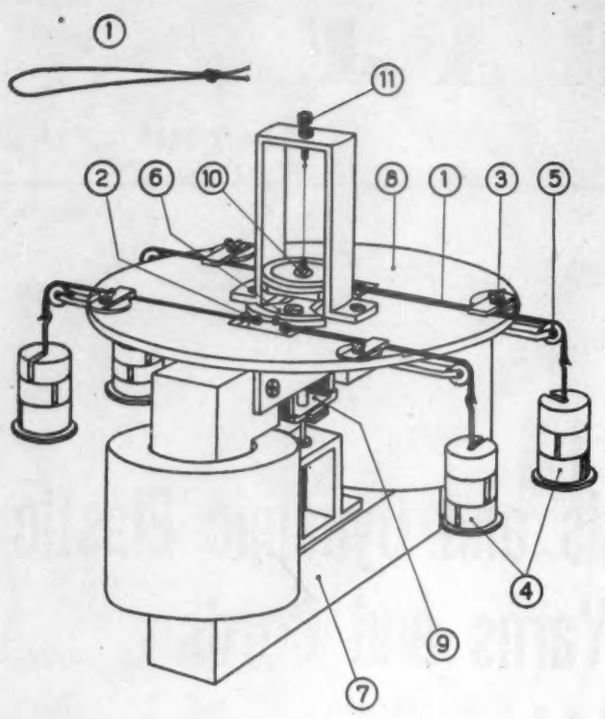

FIG. 1—Schematic drawing of the textile fibers resonance test apparatus.

Before starting the test the clamps (3) are closed and the yarns or cords remain under a permanent static strain determined by the value of the applied weights. Periodical tension stresses can in this way be superimposed with perfect symmetry on each side of the static deformation position of the specimen. The dynamic stress is impressed on the sample by means of the cross-arm (6) fixed to the coil (9) hung on the screw (11) by a fine gauge steel wire. This coil oscillates on the two bearings (10), and is electrically-driven in a magnetic field (7) by the current generated from a 50-watt amplifier-oscillator unit of the beat frequency type (range of frequency 0-10,000 cycles/sec.).

The output impedance of the amplifier has been matched with that of the moving coil and the sinusoidal character of the current in the coil has been checked by means of a cathode ray oscillograph. The frequency of the oscillator can thus be varied continuously from 0 to the desired frequency. A reed type frequency meter is used to measure the frequency up to 125 cycles/sec, higher values being measured with a frequency bridge.

It is possible to obtain resonance conditions at different frequencies with the same samples by simply varying the supplementary weights in the mass system, or by varying the elastic constant of the system by modifying the composition of the sample.

Elongation amplitudes are read on a transparent scale by means of a luminous line reflected by the concave mirror on the coil (9). The static elastic modulus E can also be measured by means of direct current or by a couple of weights applied to the system.

Determination of Hysteresis Losses and Elastic Modulus

In the oscillating system, such as that described above, the sample acts as a torsional spring with a spring stiffness $\frac{1}{C}$ (dyne cm/rad.), and a viscous resistance proportional to the rotating speed and having a proportionality constant (dyne cm sec/rad) which we will indicate with b.

If J is the moment of inertia of the oscillating system (gr. sq. cm.), α the rotation in radians, and $\Gamma \cos \omega t$ the impressed momentum* (dyne. cm.) where ω is the angular frequency and f the frequency, then we can write the motion equation as follows

$$\Gamma \cos \omega t = J\frac{d^2\alpha}{dt^2} + b\frac{d\alpha}{dt} + \frac{\alpha}{C} \qquad (1)$$

The solution of this equation, well known in alternating current problems in electricity, is

$$\alpha = \frac{\Gamma \cos \omega t \ (\omega t - \theta)}{\sqrt{\left(\frac{1}{C} - J\omega^2\right)^2}} \quad \text{where } \tan \theta = \frac{b\omega}{\frac{1}{C} - J\omega^2} \qquad (2)$$

Working in resonance amplitude conditions it is

$$\omega^2 = \frac{1}{CJ} - \frac{b^2}{2J} \qquad (3)$$

and equation (2) becomes

$$\alpha_{max} = \frac{\Gamma \cos \omega t \ (\omega t - \theta)}{b\sqrt{\omega^2 + \frac{b^2}{4J^2}}} \quad \text{where } \tan \theta = \frac{2\omega J}{b} \qquad (4)$$

When $\frac{b}{2J}$ is less than 1, as in our case, equation (4) is reduced with small error to

$$\alpha_{max} = \frac{\Gamma \sin \omega t}{b\omega} \quad \text{where } \alpha_{max} = A_{max} \cos \omega t$$

Under these conditions equation (3) becomes very nearly

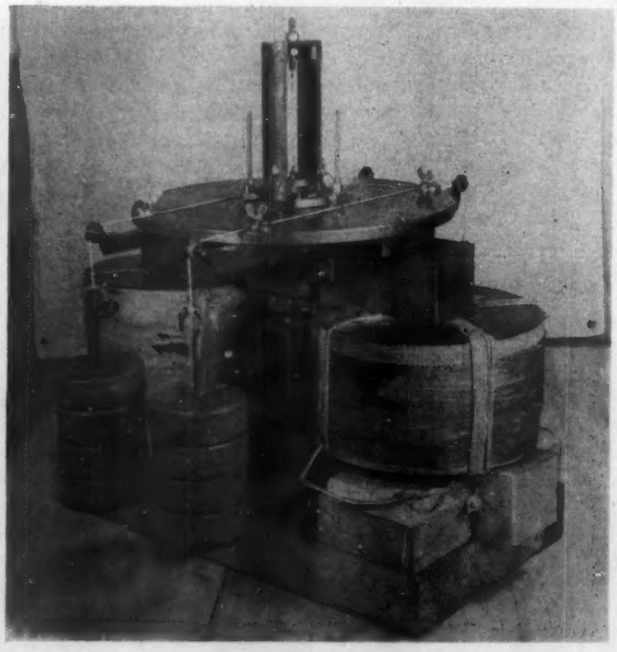

FIG. 2—View of textile fibers resonance test apparatus.

* The impressed momentum is measured by the current passing through the coil, and the relation between momentum and current is determined by calibration with direct current, or by means of applied weights.

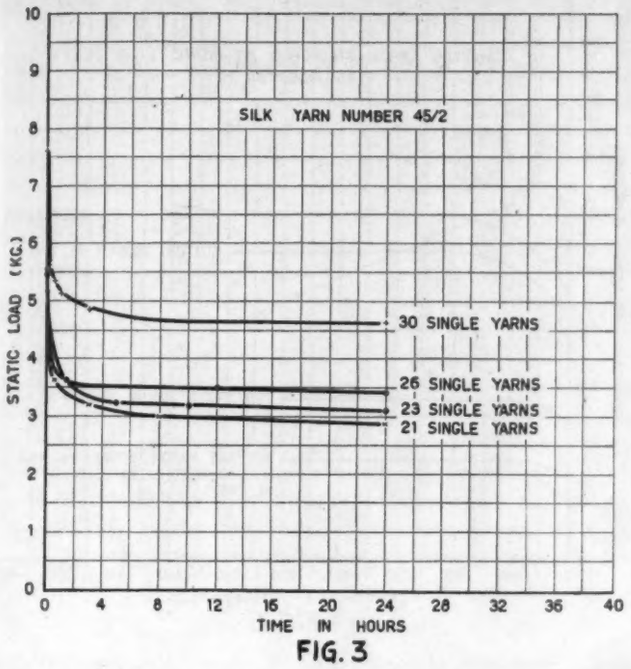

FIG. 3

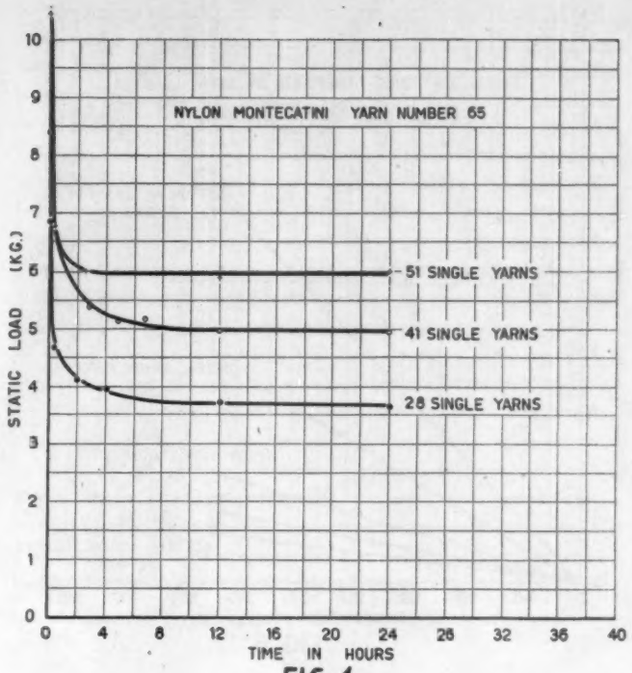

FIG. 4

FIG. 3—Life test of various combinations of single yarns of silk (raw). FIG. 4—Life test of various combinations of single yarns of nylon (Montecatini). (Temperature of tests, 20° C.; R. H. 70%).

$$\frac{1}{C} = J\omega^2 \qquad (5)$$

The energy losses through heat, i.e., the hysteresis losses H, can be calculated as follows

$$H = \int_0^{\alpha} b \frac{d\alpha}{dt} d\alpha \quad \text{erg/sec.}$$

and solving

$$H = \frac{\int \omega A_{max}}{2} \cdot 10^{-7} \quad \text{watt}$$

where A max. is the maximum deflection of the coil in radians.

Dividing H by the weight (grams) or by the length (meter) of the textile sample under test, we obtain the watt/gr. or watt/m. losses which correspond to a maximum elongation of the specimen

$$\frac{\Delta l}{l} = \frac{A_{max} B}{l} \%$$

where B is the length of half the cross-arm, and 1 the length of the samples used in the test (10 cm.).

To calculate the elastic modulus it is necessary to know the driving momentum, which differs from the impressed momentum inasmuch as this only compensates the energy losses due to hysteresis. Equation (5), valid in resonance conditions, provides a direct method for the determination of the driving momentum. In fact, by measuring and knowing J, calculating the spring stiffness $\frac{1}{C}$ ($\frac{\text{dyne. cm.}}{\text{rad}}$) by means of equation (5), and knowing the maximum amplitude of rotation A max. (radians), we can also calculate the maximum value of the driving couple applied to the sample $\frac{A \text{ max.}}{C}$.

From the value of the driving momentum, and knowing the cross-section of the specimens, the stress, which referred to the strain gives the dynamic elastic modulus, can easily be calculated.

Considerations on Measurements and Method

In service conditions cords are strained by a static permanent stress and the dynamic stress is superimposed. It is therefore necessary to establish the value of the static stress to be indefinitely supported by the yarn or cord before determining the composition of the cord or combination of single yarns for the test. As a

TABLE I—PHYSICAL AND MECHANICAL CHARACTERISTICS OF TESTED CORDS

Type of Textile Fiber	Cord Composition	Weight (gr/m)	Specific Gravity (gr/c. cm.)	Cross Section (sq. cm.)	Breaking Load (dynamometer) (kg.)	Life-test Load (kg.)	Stabilizing Load (kg.)	Permanent Static Load (kg.)
"AE" type cotton	23/5 x 3	0.425	1.52	$2.8\ 10^{-5}$	8.4	4.2	4	2
Viscose rayon "P"	550/2 x 3	0.410	1.51	$2.715\ 10^{-5}$	8.6	4.1	4	2
"Montecatini" nylon	65/17 x 3	0.410	1.16	$3.535\ 10^{-5}$	..	..	4	2
Acetate rayon (M)	550/2 x 3	0.42	1.28	$3.28\ 10^{-5}$	6.3	2	1.5	1
Triacetate rayon (M)	400/2 x 3	0.26	1.28	$2.03\ 10^{-5}$	4.6	1.2	1	1

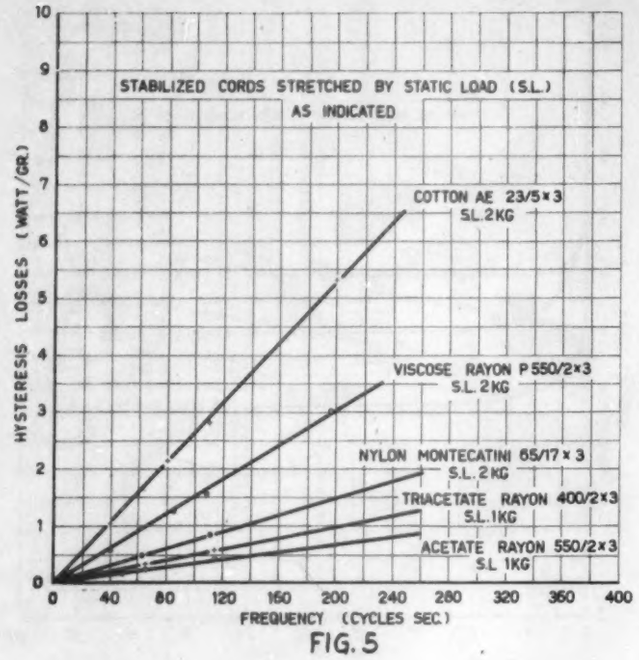
STABILIZED CORDS STRETCHED BY STATIC LOAD (S.L.) AS INDICATED
COTTON AE 23/5×3 S.L. 2KG
VISCOSE RAYON P 550/2×3 S.L. 2KG
NYLON MONTECATINI 65/17×3 S.L. 2KG
TRIACETATE RAYON 400/2×3 S.L. 1KG
ACETATE RAYON 550/2×3 S.L. 1KG
HYSTERESIS LOSSES (WATT/GR.)
FREQUENCY (CYCLES SEC.)

FIG. 5

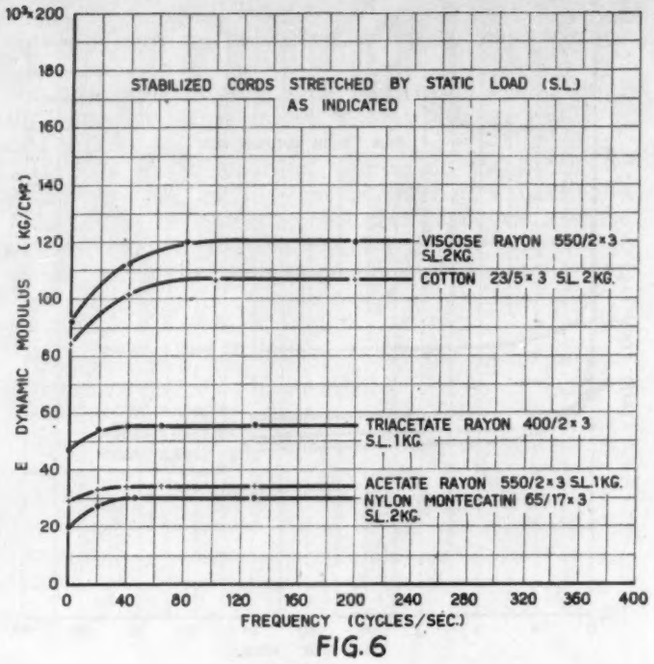
STABILIZED CORDS STRETCHED BY STATIC LOAD (S.L.) AS INDICATED
VISCOSE RAYON 550/2×3 S.L. 2KG.
COTTON 23/5×3 S.L. 2KG.
TRIACETATE RAYON 400/2×3 S.L. 1KG.
ACETATE RAYON 550/2×3 S.L. 1KG.
NYLON MONTECATINI 65/17×3 S.L. 2KG.
E DYNAMIC MODULUS (KG/CM²)
FREQUENCY (CYCLES/SEC.)

FIG. 6

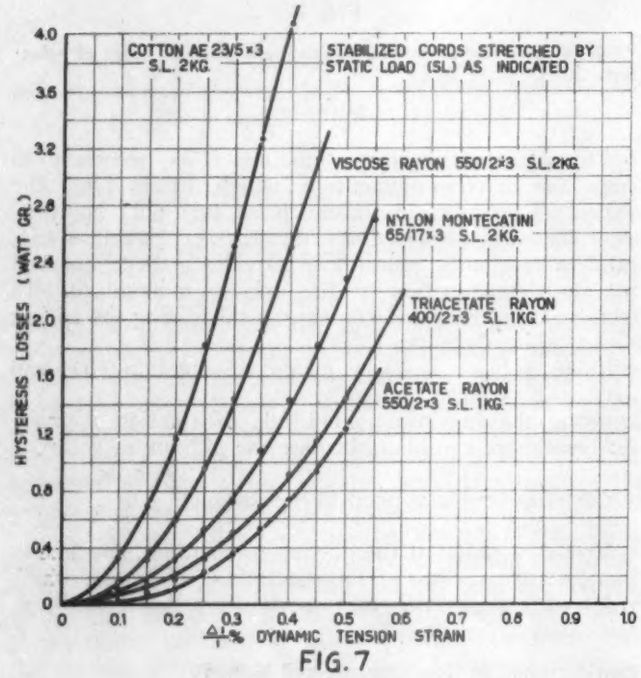
COTTON AE 23/5×3 S.L. 2KG.
STABILIZED CORDS STRETCHED BY STATIC LOAD (S.L.) AS INDICATED
VISCOSE RAYON 550/2×3 S.L. 2KG.
NYLON MONTECATINI 65/17×3 S.L. 2KG.
TRIACETATE RAYON 400/2×3 S.L. 1KG.
ACETATE RAYON 550/2×3 S.L. 1KG.
HYSTERESIS LOSSES (WATT GR.)
Δl/l % DYNAMIC TENSION STRAIN

FIG. 7

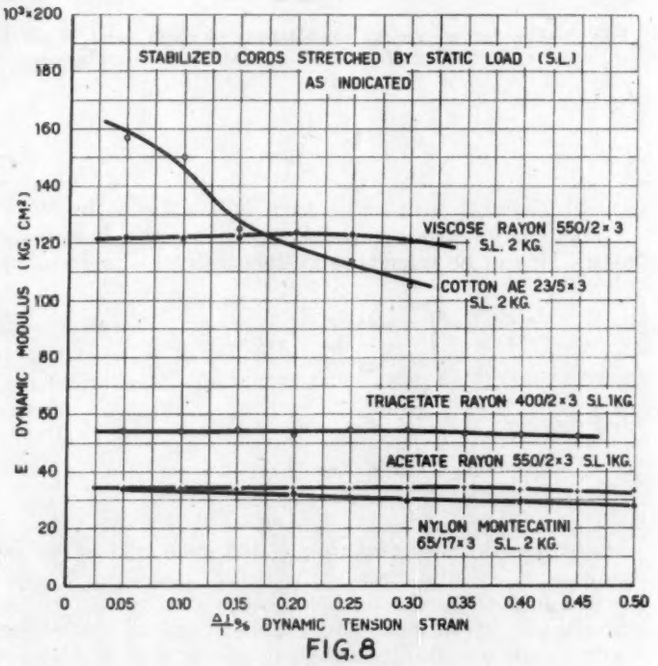
STABILIZED CORDS STRETCHED BY STATIC LOAD (S.L.) AS INDICATED
VISCOSE RAYON 550/2×3 S.L. 2 KG.
COTTON AE 23/5×3 S.L. 2 KG.
TRIACETATE RAYON 400/2×3 S.L. 1KG.
ACETATE RAYON 550/2×3 S.L. 1KG.
NYLON MONTECATINI 65/17×3 S.L. 2 KG.
E DYNAMIC MODULUS (KG. CM²)
Δl/l % DYNAMIC TENSION STRAIN

FIG. 8

FIG. 5—Hysteresis losses versus frequency for different cords (dynamic strain $\frac{\Delta l}{l} = 0.3\%$). FIG. 6—Dynamic modulus E versus frequency for different cords, (dynamic tension strain $\frac{\Delta l}{l} = 0.3\%$). FIG. 7—Hysteresis losses versus dynamic tension strain of different cords (frequency, 100 cycles/sec.) FIG. 8—Dynamic modulus E versus dynamic tension strain of different cords.

(Temperature of tests, 20° C.; R. H. 70%).

criterium for the evaluation of the mechanical resistance of the cord or yarns we have preferred to consider the life test load, i.e., the maximum static load which can be supported without breakdown for a very long time.

We have confirmed experimentally that the life load is fairly proportional to the number of yarns (Figs. 3 and 4). In this way, knowing the life-load of the single yarns and the desired safety factor, it is possible to determine the number of single yarns for a given static load. In our test a static load of 2 kg. was used for cord, or an equivalent combination of yarns, and this is not far from the value employed in practical applications. The safety factor of our tests was about 0.57, i.e., the life-load of the specimen was about 3.5 kg.

Before testing the cords it was necessary, in order to avoid inconsistent results, to stabilize them by stretching for a few hours with weights of such values as to create a load as near as possible to that of the life-load.

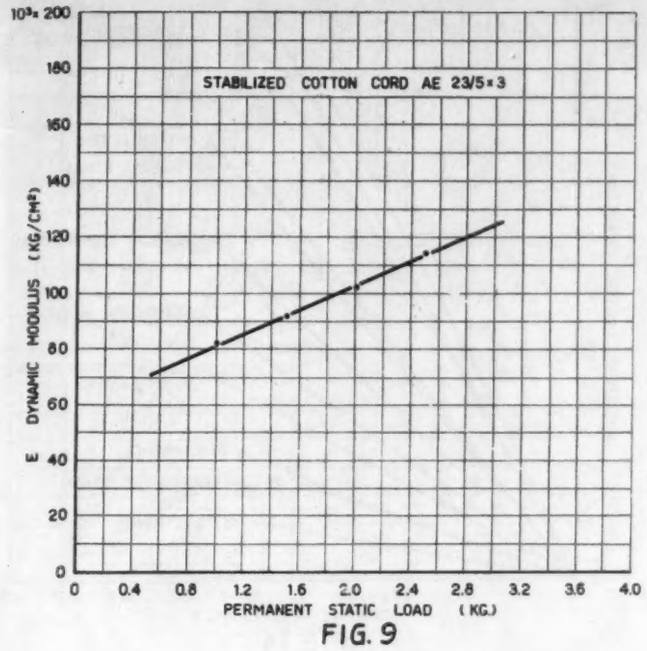

FIG. 9

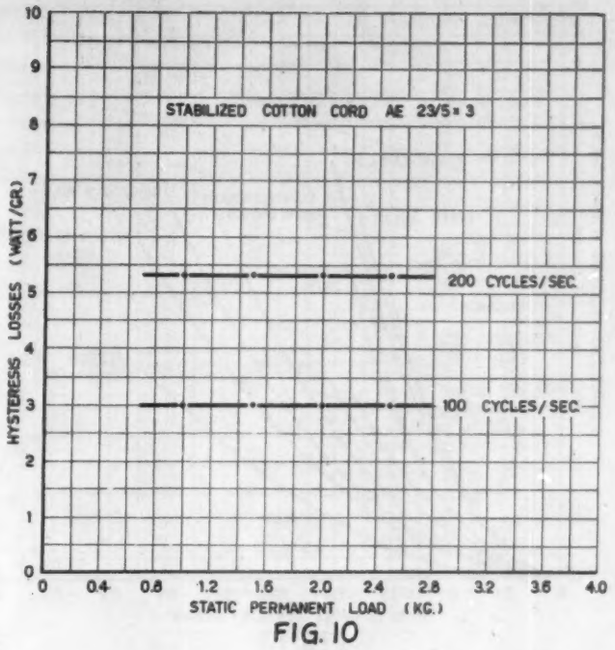

FIG. 10

FIG. 9—Dynamic modulus E versus permanent static load of cotton cord. FIG. 10—Hysteresis losses versus permanent static load of cotton cord (frequency, 100 cycles/sec. and 200 cycles/sec.; dynamic tension strain, $\frac{\Delta l}{l} = 0.3\%$). (Temperature of tests, 20° C.; R. H. 70%).

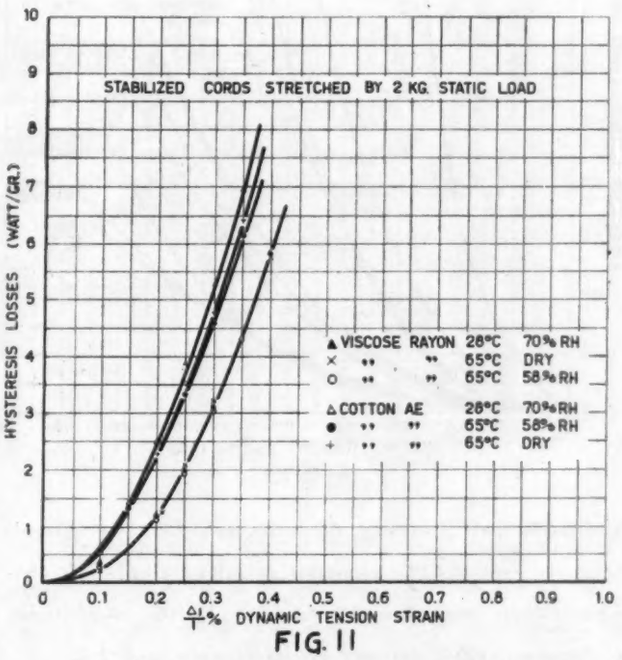
STABILIZED CORDS STRETCHED BY 2 KG. STATIC LOAD
HYSTERESIS LOSSES (WATT/GR.)
▲ VISCOSE RAYON 28°C 70% RH
× " " 65°C DRY
○ " " 65°C 58% RH
△ COTTON AE 28°C 70% RH
● " " 65°C 58% RH
+ " " 65°C DRY
% DYNAMIC TENSION STRAIN

FIG. 11

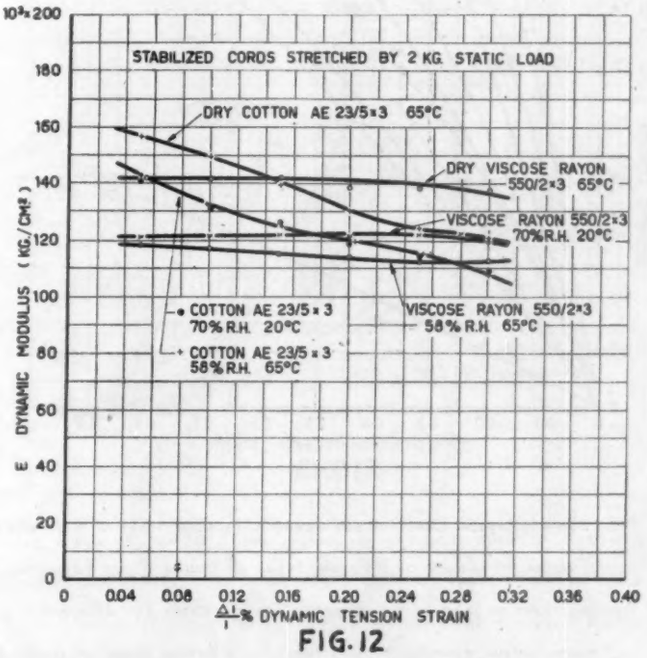
STABILIZED CORDS STRETCHED BY 2 KG. STATIC LOAD
DRY COTTON AE 23/5×3 65°C
DRY VISCOSE RAYON 550/2×3 65°C
VISCOSE RAYON 550/2×3 70% R.H. 20°C
COTTON AE 23/5×3 70% R.H. 20°C
VISCOSE RAYON 550/2×3 58% R.H. 65°C
COTTON AE 23/5×3 58% R.H. 65°C
E DYNAMIC MODULUS (KG/CM²)
% DYNAMIC TENSION STRAIN

FIG. 12

FIG. 11—Hysteresis losses versus dynamic tension strain for viscose rayon and cotton cords at different temperatures and R. H. conditions (frequency, 200 cycles/sec.). FIG. 12—Dynamic modulus E versus dynamic tension strain for cotton and viscose rayon cords at different temperatures and R. H. conditions.

This, in fact, causes a permanent elongation and a reduction in the diameter of the cords due to the penetration of the yarn plies. We have found that it is not necessary to treat single yarns in this way and they can be tested without special precautions.

When applying a permanent static load of 2 kg., the maximum value of the dynamic load used for the test has to be limited to this value so as to ensure a minimum residual static tension on the sample. It has not been possible, however, to superimpose a dynamic load of this value on all kinds of textile fibers, as some of them reach permanent deformation before this value. For cotton yarns, for instance, the maximum permissible dynamic load has been found to be not greater than 0.6

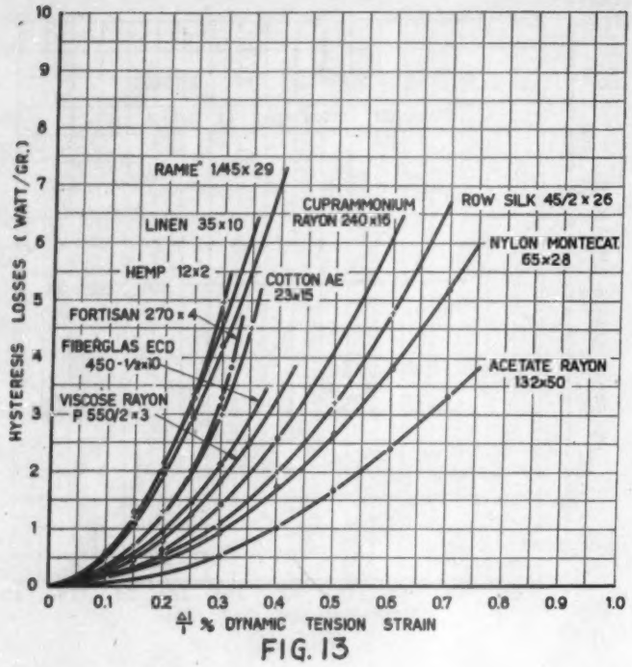

FIG. 13

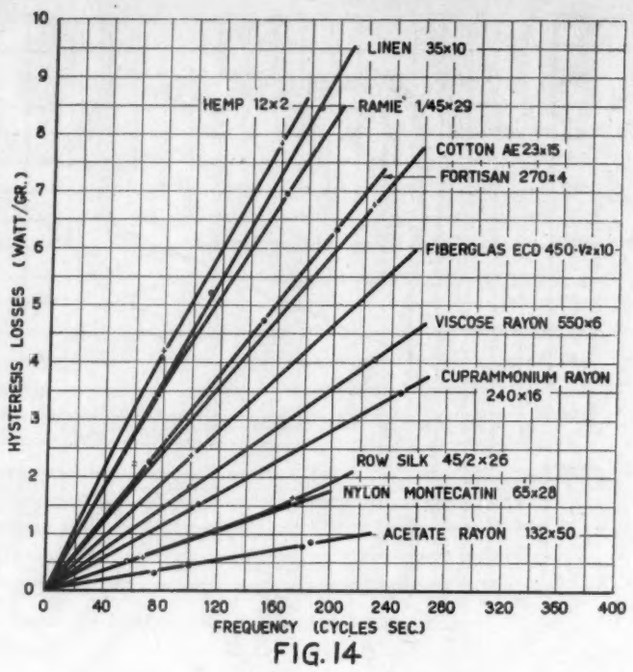

FIG. 14

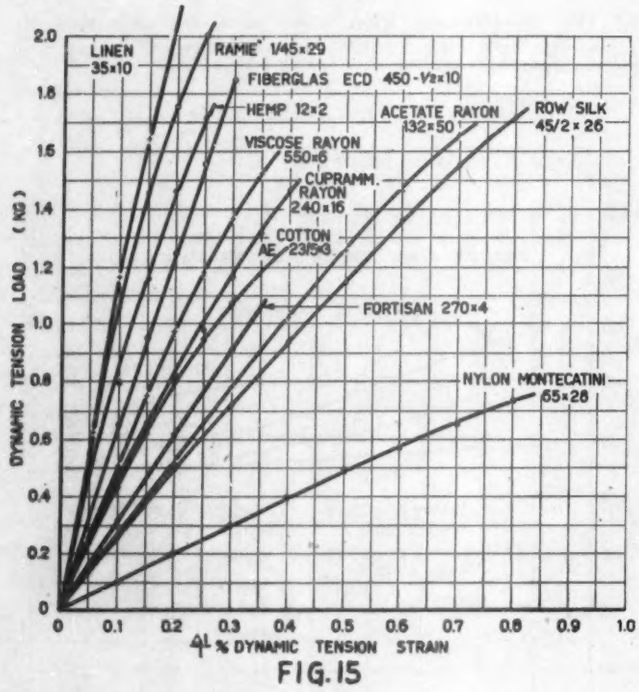

FIG. 15

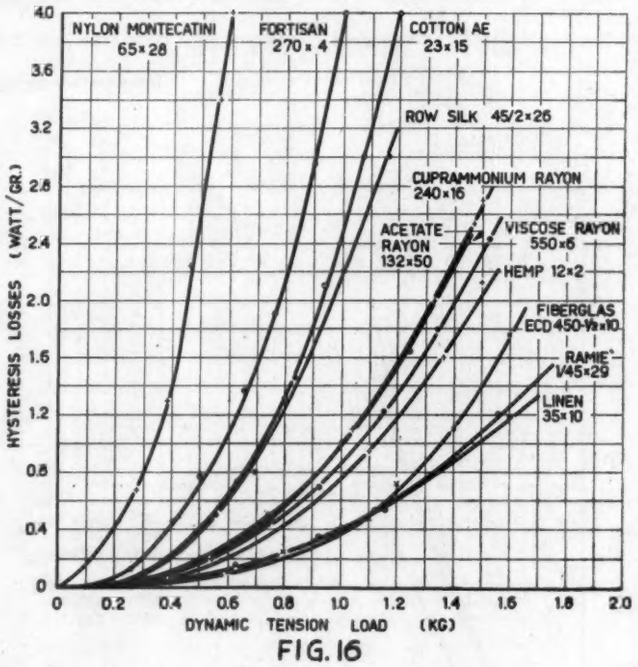

FIG. 16

FIG. 13—Hysteresis losses versus dynamic tension strain of different types of textile fibers (frequency, 100 cycles/sec.). FIG. 14—Hysteresis losses versus frequency of different types of textile fibers (dynamic tension strain, $\frac{\Delta l}{l} = 0.3\%$; permanent static load, 2 kg.). FIG. 15—Dynamic tension load versus dynamic tension strain for different types of textile fibers (permanent static load, 2 kg.). FIG. 16—Hysteresis losses versus dynamic tension load for different types of textile fibers (frequency, 100 cycles/sec.; permanent static load, 2 kg.). (Temperature of tests, 20° C.; R. H. 70%).

of the permanent static load, while for viscose rayon yarns it has been possible to obtain values up to 0.75, and for nylon and acetate rayon values up to 0.85. All tests, unless otherwise specified, have been carried out at room temperature of 20° C. and 70% R. H.

Test Results

Tests on Cords: Special tests have been made on different kinds of cords to investigate the effect of variations in physical parameters. These experiments have included the measurement of the dynamic properties with varying frequency, permanent strain, temperature and moisture conditions. The composition of the cords tested and their mechanical and physical properties are reported in Table I.

The hysteresis losses at constant dynamic strain and

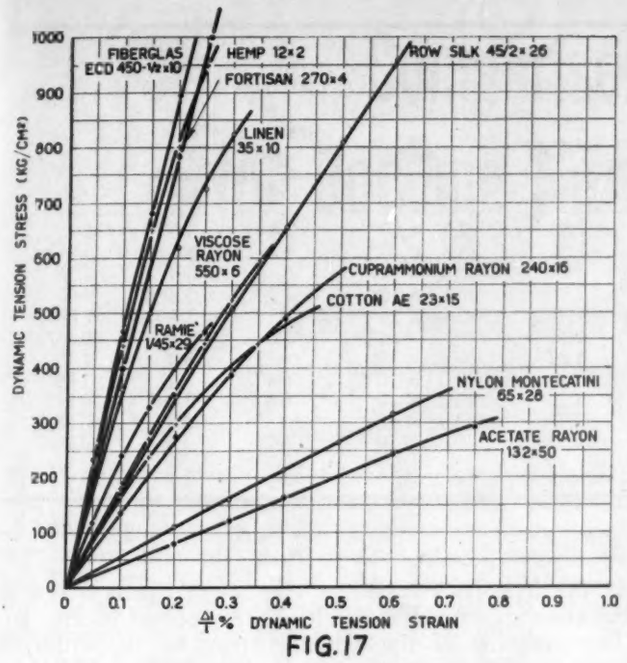

FIG. 17

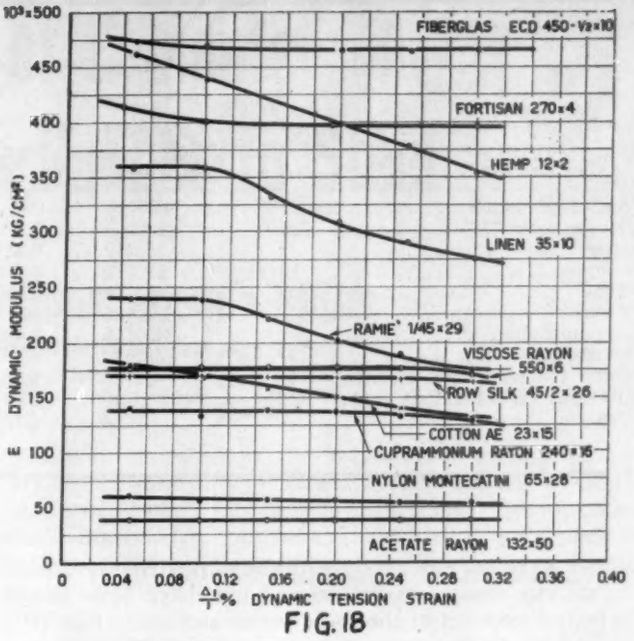

FIG. 18

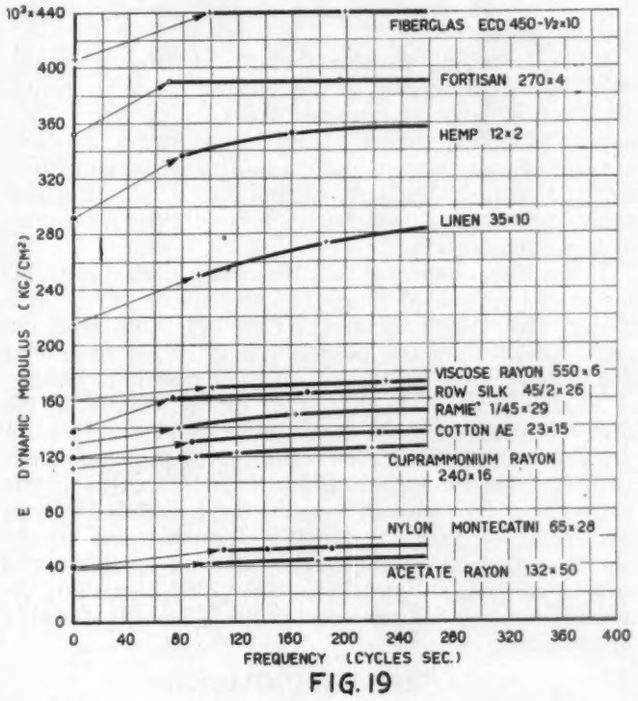

FIG. 19

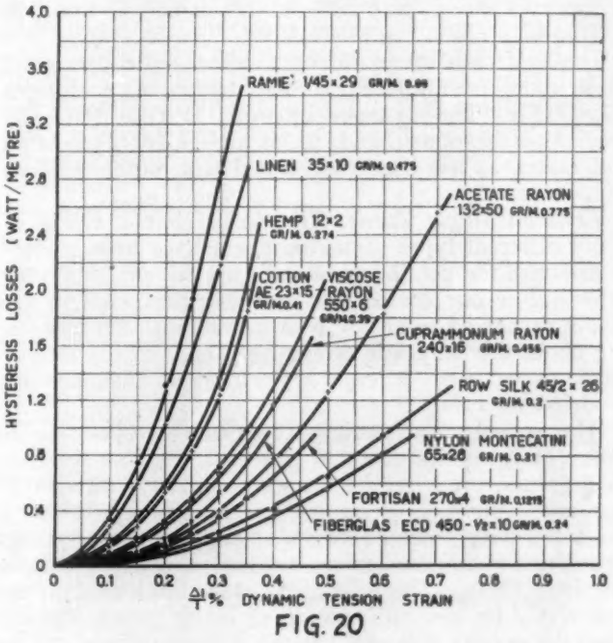
RAMIE 1/45×29 GR/M. 0.66
LINEN 35×10 GR/M. 0.475
ACETATE RAYON 132×50 GR/M. 0.775
HEMP 12×2 GR/M. 0.274
COTTON AE 23×15 GR/M. 0.41
VISCOSE RAYON 550×6 GR/M. 0.39
CUPRAMMONIUM RAYON 240×16 GR/M. 0.455
ROW SILK 45/2×26 GR/M. 0.2
NYLON MONTECATINI 65×28 GR/M. 0.21
FORTISAN 270×4 GR/M. 0.1219
FIBERGLAS ECD 450-½×10 GR/M. 0.24
HYSTERESIS LOSSES (WATT/METRE)
Δl/l % DYNAMIC TENSION STRAIN

FIG. 20

FIG. 17—Dynamic specific stress versus dynamic tension strain of different types of textile fibers. FIG. 18—Dynamic modulus E versus dynamic tension strain of different types of textile fibers. FIG. 19—Dynamic modulus E versus frequency of different types of textile fibers (dynamic tension strain, $\frac{\Delta l}{l} = 0.3\%$). FIG. 20—Hysteresis losses (w/m) versus dynamic tension strain for different types of textile fibers (frequency, 100 cycles/sec.). (Temperature of tests, 20° C.; static permanent loads, 2 kg.; R. H. 70%).

temperature seem to increase proportionally with the frequency (see Fig. 5).

The dynamic elastic modulus E is seen to be independent of frequency in the examined range above 100 cycles/sec. (see Fig. 6). The static modulus values are also plotted in Fig. 6 and are found to be lower than the dynamic modulus.

The hysteresis losses at constant frequency and temperature are found to follow a quadratic law versus dynamic tension strain (see Fig. 7). The dynamic modulus E at constant temperature is independent of dynamic tension strain for nylon and viscose, acetate and triacetate rayon, within the limits of the test. This independence is not exactly true for cotton cords, where an increase in dynamic tension strain produces a decrease in modulus (Fig. 8). The dynamic modulus E rises with the permanent static load (see Fig. 9) in the range of 1 to 2.5 kg., i.e., a cord which is statically less strained

TABLE II—PHYSICAL AND MECHANICAL CHARACTERISTICS OF TESTED YARNS

Type of Textile Fiber	Yarn No. of Single Yarns	Combination of Tested Yarns	Weight (gr./m.)	Specific Gravity (gr./c. cm.)	Cross Section (sq. cm.)	Breaking Load (dynamometer) (kg.)	Life-Test Load (kg.)	h
"AE" type cotton	23	23×15	0.41	1.52	27.0×10^{-4}	7.6	3.5	1
Viscose rayon "P"	550	550×6	0.39	1.51	25.8×10^{-4}	8.25	3.4	0.951
Linen	35	35×10	0.475	1.54	30.8×10^{-4}	6	3.6	1.16
Hemp	12	12×12	0.274	1.51	18.1×10^{-4}	7	3.2	0.67
Ramie	1/45	1/45×29	0.69	1.55	44.6×10^{-4}	8.5	3.3	1.58
Silk	45/2	45/2×26	0.2	1.41	14.2×10^{-4}	5.6	3.4	0.487
Cuprammonium	240	240×16	0.456	1.52	30.0×10^{-4}	4.25	3.2	1.18
Acetate rayon	132	132×50	0.775	1.28	60.0×10^{-4}	6.45	3.4	1.89
Nylon (Montecatini)	65	65×28	0.212	1.16	18.3×10^{-4}	6.8	3.6	0.517
Fiberglas (OW) E.C.D.	450½	450½×10	0.24	1.723	13.93×10^{-4}	11.52	3.8	0.585
Fortisan	270	270×4	0.1215	1.55	7.84×10^{-4}	6.75	3.6	0.296

shows a greater elongation with the same dynamic stress. Hysteresis losses, on the other hand, have been found to be independent of the static permanent load (Fig. 10).

The effect of temperature and relative humidity are shown in Figs. 11 and 12, which illustrate the tests made on cotton and viscose rayon cords at room temperature of 20° C. and 70% R. H., at 65° C. and 5% R. H. and at 65° C. and 58% R. H.

The hysteresis losses for both rayon and cotton seem to be independent of R. H. and temperature changes (Fig. 11). The dynamic modulus E (see Fig. 12) seems, on the other hand, to be higher for dry cotton and rayon, as has been ascertained with other methods *(3)*.

Tests on Single Yarns: The elastic characteristics of many different types of textile fibers have been studied to establish the possibility of their use for practical purposes. For our comparison we have preferred to use single yarns and to group them in combinations possessing about the same life strength. The combinations of single yarns of the different types of fibers examined are reported in Table II.

The conventional static properties corresponding to different yarns are given in this table, as also the life-load values, cross section*, specific gravity, yarn number and weight in gr/m. of yarn. The coefficient h gives the weight ratio between cotton and the necessary quantity of different fibers needed to reach the same life-load value. The permanent static load used in the test was 2 kg. per combination of single yarns. In this way the results obtained for the different fibers can be compared for purposes of practical application.

The hysteresis loss and dynamic modulus measurements on different yarns have been carried out at a minimum of 2 frequencies, and those made on combined yarns have confirmed the results obtained on cords with relation to the effect of physical parameter changes.

The only difference noticed is a higher modulus for combined yarns than for cords; this, however, is obvious because besides a deformation of the fibers, the geometrical deformation of the cord itself has also to be considered. Figs. 13 and 14 show the hysteresis losses in watt/gr. for the different textile fibers versus strain at constant frequency, and versus frequency at constant strain.

Fig. 15 shows the dynamic load of the different fibers versus dynamic strain, while the calculated values of the hysteresis losses at constant frequency versus the superimposed dynamic load are reported in Fig. 16. The variation of the dynamic stress of the different fibers versus dynamic strain is given in Fig. 17, while Fig. 18 shows their dynamic elastic modulus versus dynamic strain.

It is interesting to note that the dynamic modulus seems to be independent of the dynamic strain for yarns made of long or continuous filaments or fibers, i.e., nylon, Fiberglas, viscose rayon, acetate rayon, cuprammonium rayon, fortisan and silk. This is not true however for cotton, hemp, linen and ramie, all of which show a modulus which decreases with increasing dynamic tension strain.

It has been confirmed that the dynamic elastic modulus in the examined range is independent of the frequency over 100 cycles/sec. (Fig. 19). Values of the static modulus are also plotted in Fig. 19 and have been found to be lower than those of the dynamic modulus.

The mechanical characteristics of the various textile fibers vary considerably, on the other hand, and it is not possible to determine their behavior in practical applications from an examination of their specific elastic properties. We give in Fig. 20 the hysteresis in watt per meter of yarns at constant frequency versus the dynamic tension strain. The data in watt/m. and weight/m. give a direct and comparative picture of the possibilities of the various textile fibers for practical applications.

ACKNOWLEDGMENT

The author is grateful to Dr. L. Emanueli for the suggestions, encouragement and helpful criticism received in connection with the preparation of this paper. He wishes also to thank many members of the Pirelli Research Laboratories for their cooperation in this work, particularly Dr. Castellani and Dr. Gè, who contributed some of the data given herein. The permission of the Pirelli Soc. per Azioni to publish this paper is also greatly appreciated.

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* The cross section has been determined from the specific gravity and from the weight per meter of yarn.

Comparison of Cements for Bonding Nitrile Rubber to Steel

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THE purpose of this paper is to present a comparison of chlorinated rubber versus phenolic resin for bonding a nitrile rubber stock to steel. Although the information presented in this paper undoubtedly has been obtained before by many rubber laboratories, this is the first time to the authors' knowledge that quantitative data have been published.

Whereas chlorinated rubber has been used to bond nitrile rubber stocks to steel since the introduction of nitrile rubbers in this country, the use of phenolic resins for this purpose is relatively new. Merrill *(2)* pointed out that phenolic resins were first used extensively during the war for vulcanizing nitrile rubber stocks to steel and aluminum, and that this development was primarily activated by the necessity of finding an adhesive resistant to 40% aromatic fuels for use in fabrication of aircraft fuel tank fittings. The present authors were interested in comparing chlorinated rubber bonds with phenolic resin bonds for reliability and resistances to gasoline-type fuels, boiling water and high temperatures.

Note: This paper was presented before the Division of Rubber Chemistry, A.C.S., at Los Angeles, Calif., July 22-23, 1948. The opinions or assertations are those of the authors and are not to be considered as official or reflecting the views of the Navy Department or the Naval Service at large.

Cements Tested

Two chlorinated natural rubber cements and one phenolic resin cement were tested in this investigation. One chlorinated rubber cement was prepared from Parlon, a chlorinated Hevea rubber manufactured by the Hercules Powder Company. This product was the 125 centipoise grade and was in the form of a white powder having a chlorine content of 66.8%.

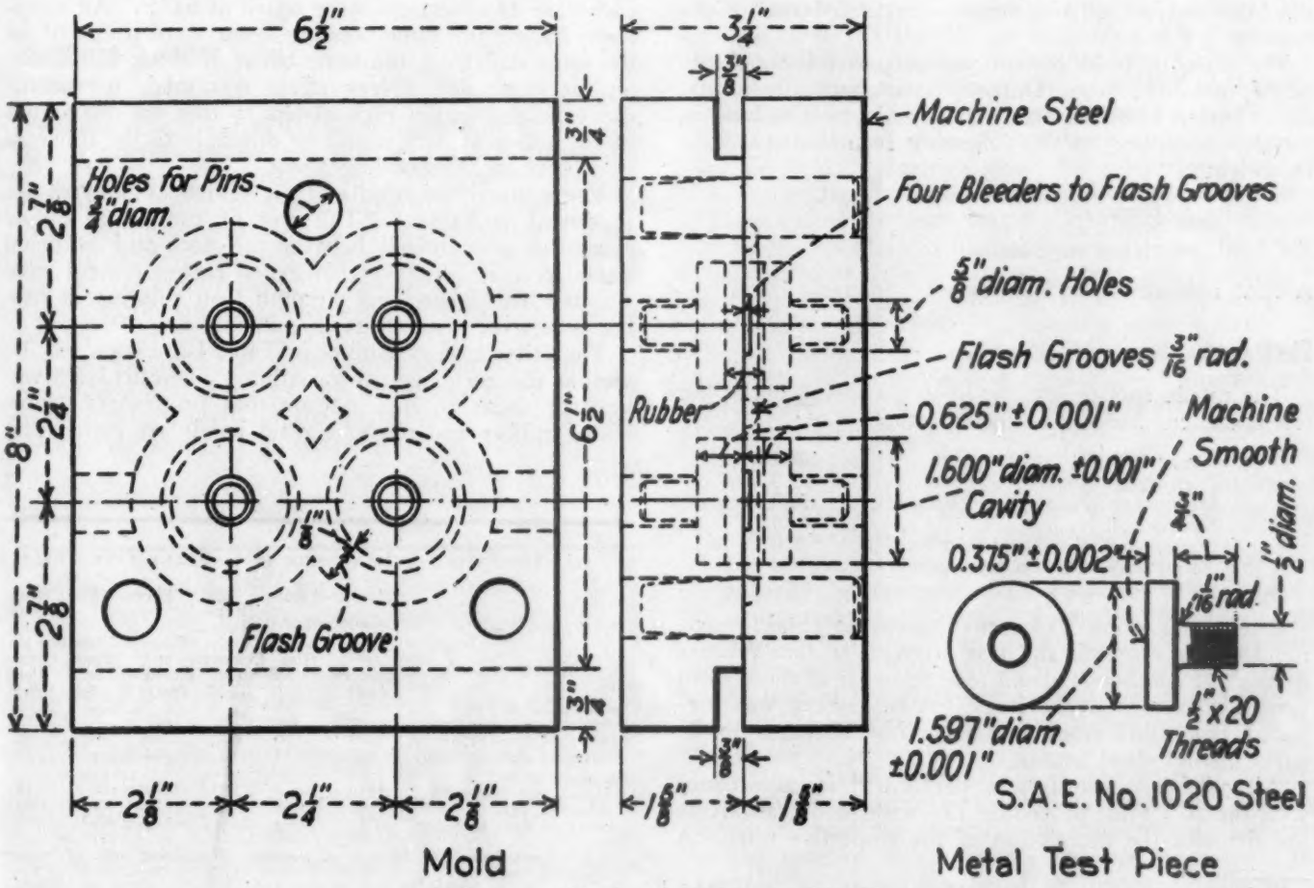

FIG. 1 — Adhesion test pieces and mold.

TABLE I—RESULTS OF STATISTICAL ANALYSES

	Chlorinated Rubber Bond	Proprietary Chlorinated Rubber Bond	Phenolic Resin Bond
First Statistical Analysis			
Number of determinations	22	——	24
Maximum adhesive strength, psi	1540	——	1545
Minimum adhesive strength, psi	880	——	1169
Average adhesive strength, psi	1255	——	1360
Standard deviation, psi	190	——	99
Coefficient of variation, %	15.5	——	7.3
Second Statistical Analysis			
Number of determinations	24	24	24
Estimated percentage of rupture in cement bond	100	85	95
Maximum adhesive strength, psi	1202	1592	1227
Minimum adhesive strength, psi	685	990	852
Average adhesive strength, psi	1026	1416	1094
Standard deviation, psi	129	136	102
Coefficient of variation, %	12.6	9.6	9.4

The cement was prepared according to the following formulation (parts by weight):

Parlon	15
Dibutyl phthalate	1
Toluene	100

The dibutyl phthalate was included to prevent the dried film from becoming too brittle. A clear solution resulted. This cement will be identified hereinafter simply as chlorinated rubber cement.

The other chlorinated rubber cement was Ty-Ply S, sold by the R. T. Vanderbilt Company. This proprietary cement is a dark-colored liquid containing other ingredients besides chlorinated rubber. These ingredients are probably included for purposes of vulcanization, acceleration, plasticization, and stabilization. Several of these ingredients are insoluble in the solvent and settle out on standing. This cement will be identified hereinafter as proprietary chlorinated rubber cement.

The phenolic resin cement was prepared from Durez 12987, obtained from Durez Plastics and Chemicals, Inc. Durez 12987, a brown powder, was dissolved in solvents according to the following formulation (parts by weight):

Durez 12987	25.0
Methyl alcohol	37.5
Methyl ethyl ketone	37.5

A clear reddish brown solution was obtained.

Stock Used

The nitrile rubber stock used in preparing all of the test specimens had the following composition:

Hycar OR-15	100.0
Zinc oxide	5.0
Medium processing channel black	50.0
Stearic acid	1.0
Coumarone-indene semi-fluid resin	20.0
Tetramethyl thiuram monosulfide	0.3
Sulfur	1.2

This composition was used in order to obtain maximum tensile strength and tear strength so that rupture of the test specimens would tend to occur at the cement bond rather than in the stock. A tie cement was prepared from this stock by dispersing 15 parts in 85 parts methyl ethyl ketone.

All adhesion testing was performed in accordance with the A.S.T.M. procedure *(1)* with modifications as noted under the description of the respective tests. A drawing of the A.S.T.M. mold and metal test piece is shown in Figure 1. The faces of the metal test pieces were lightly sandblasted and one brush coat of primer cement applied as soon as possible after sandblasting. This coat was dried for at least one hour in the case of the phenolic resin cement and for not less than 16 hours in the cases of the chlorinated rubber cements. A second coat of primer cement was applied and dried for one hour*. This was followed by two coats of tie cement. The first coat was dried for one hour, the second coat for 30 minutes.

Pieces of stock 30 mils thick were freshened with methyl ethyl ketone and rolled down on each cemented surface. The rubber body of the test specimen was built up from disks of stock which had been freshened with this solvent. The total weight of stock was adjusted to 25 plus or minus 0.2 grams, which gave an overflow of 35%. The assembled test specimens were cured for 35 minutes at 290°F. within 48 hours after assembly. The specimens were conditioned at 82°F. for at least 4 days before subjecting them to special conditioning or testing.

Reliability of Bonds

The reliability of the three bonding agents was determined by statistical analyses of adhesion data. The first statistical analysis covered tests on 22 specimens prepared with chlorinated rubber cement and 24 specimens prepared with phenolic resin cement. The tests of each bonding agent were run at 82°F. in groups of six specimens. The same batch of stock was not used to prepare all of the groups, and the groups were not prepared at the same time or tested at the same time.

The second statistical analysis covered tests on specimens prepared with chlorinated rubber cement, proprietary chlorinated rubber cement and phenolic resin. In each case 24 specimens were tested at 82°F. All specimens having the same bonding agent were prepared on the same day from the same batch of stock and tested on the same day. Every effort was made to control the variables within each group so that the variability of the adhesion data would be due only to the inherent variability of the bonding agent.

The summarized results of the statistical analyses are presented in Table I. The area of rupture in almost every case was entirely between the stock and the metal test pieces. Proprietary chlorinated rubber cement gave a somewhat higher bond strength than chlorinated rubber cement or phenolic resin cement.

The criteria of variability in Table I are standard deviation and coefficient of variation. The calculated values for these criteria indicate that proprietary chlorinated rubber and phenolic resin bonds are equally re-

TABLE II—EFFECT OF IMMERSION IN GASOLINE-TYPE FUELS

	Chlorinated Rubber Bond			Phenolic Resin Bond		
	Load at Rupture (psi)	Change from Initial (%)	Rupture at Cement Bond (%)*	Load at Rupture (psi)	Change from Initial (%)	Rupture at Cement Bond (%)*
Immersed at 82° F.						
Initial, not immersed	1377	——	30	1449	——	15
After 14 days in SR-10	1371	0	35	1288	—11	80
After 14 days in SR-6	632	—54	40	675	—53	70
Immersed at 140° F.						
Initial, not immersed	1250	——	65	1449	——	15
After 14 days in SR-10	1182	—5	55	1158	—20	90
After 14 days in SR-6	77	—94	95	342	—76	0

* Estimated percentage of area of rupture. Remaining area of rupture was within stock.

* It had been found that two coats of chlorinated rubber cement gave definitely better adhesion than the one thin coat usually recommended.

liable, and that both surpass chlorinated rubber bonds in reliability.

Resistance to Gasoline-Type Fuels

The resistances of the chlorinated rubber and phenolic resin bonds to diisobutylene (SR-10) and a blend of 60% diisobutylene, 5% benzene, 20% toluene and 15% xylene (SR-6) were determined at 82°F. and at 140°F. The specimens were completely immersed in the fluids for 14 days and tested for adhesion at 82°F. immediately after removal. The specimens and solvents at 140°F. were allowed to cool to room temperature for 4 hours before withdrawing and testing the specimens.

The adhesion data are given in Table II. Each value in this table represents the average of 6 determinations.

It was found that immersion in SR-10 at 82°F. or at 140°F. had little effect on the breaking strengths of the chlorinated rubber specimens and the pheonolic resin specimens. Immersion in SR-6 at 82°F. considerably reduced the breaking strengths of the chlorinated rubber and phenolic resin specimens, and immersion in SR-6 at 140°F. almost reduced to zero the breaking strength of the chlorinated rubber specimens.

The phenolic resin specimens fared better after immersion in SR-6 at 140°F. Whereas their breaking strength was seriously reduced, it was the stock which broke, not the bond. In contrast, the bond of the chlorinated rubber specimens broke after this treatment. It was noted that complete penetration of the SR-6 into the specimens did not occur in 14 days at 82°F., but did occur in 14 days at 140°F.

It is manifest that phenolic resin cement should be used in preference to chlorinated rubber cement when the vulcanized assembly is to be exposed to 40% aromatic fuels in service.

Resistance to Boiling Water

The resistances of the chlorinated rubber and phenolic resin bonds to water at 212°F. were determined by completely immersing the test specimens in boiling distilled water for 7 days and pulling the specimens to rupture at 212°F. In order to separate the loss of adhesion due to temperature from the loss of adhesion due to water, specimens were also tested at 82°F. and after 2 hours and 7 days conditioning, respectively, in air at 212°F. Six replicate specimens were tested under each condition.

The tests at 212°F. were conducted in the cylindrical electrically heated oven diagrammed in Figure 2. This oven was mounted on the platform of the universal testing machine. The temperature of the oven was

TABLE III—EFFECT OF BOILING WATER

	Chlorinated Rubber Bond			Phenolic Resin Bond		
	Load at Rupture (psi)	Change from Initial (%)	Rupture at Cement Bond (%)*	Load at Rupture (psi)	Change from Initial (%)	Rupture at Cement Bond (%)*
Initial, at 82° F.	1377	——	30	1449	——	15
After 2 hours at 212° F. in air	508	—63	100	496	—66	5
After 7 days at 212° F. in air	462	—66	0	439	—70	0
After 7 days at 212° F. in water	281	—80	35	180	—88	70

* Estimated percentage of area of rupture. Remaining area of rupture was within stock.

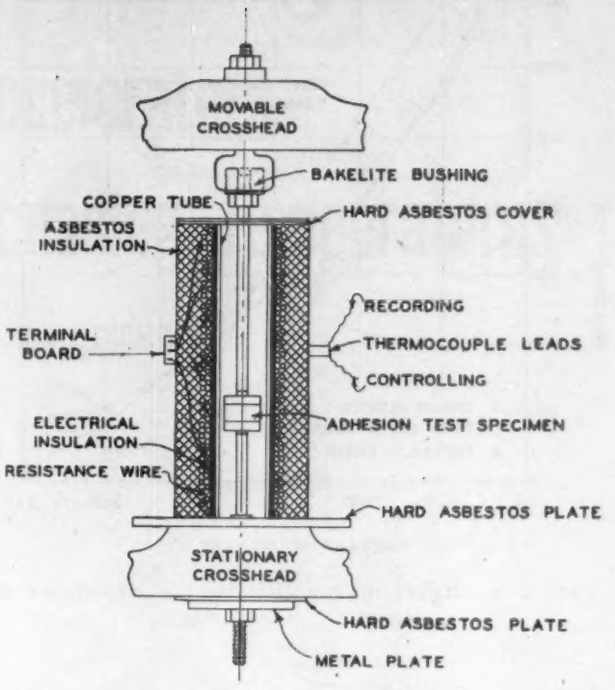

FIG. 2 — Oven and accessory apparatus for adhesion tests at elevated temperatures.

recorded and controlled with a precision of plus or minus 2°F. by means of thermocouples placed near the test specimen. These thermocouples activated a recording potentiometer and controlling potentiometer, respectively.

It was found by molding a thermocouple into the geometric center of the rubber body of the test specimen that 2 hours were necessary for the entire specimen to arrive at the highest temperature (350°F.) used in this investigation. Accordingly, all specimens which were initially at room temperature (82°F.) were allowed to remain in the cylindrical oven for 2 hours before testing, no matter what test temperature was being used. When specimens were transferred from another oven or from boiling water to the cylindrical oven, they were transferred as rapidly as possible and were conditioned in the cylindrical oven for 30 minutes to be sure that they were at the correct temperature when tested.

The results of the tests at 212°F. are shown in Table III. It will be noted that raising the temperature to 212°F. decreased the breaking strengths about 60% and that conditioning for 7 days at this temperature had little further effect. However 7 days in boiling water further reduced the breaking strengths, and the reduction was greater for the phenolic resin specimens than for the chlorinated rubber specimens.

The breaking strengths listed in Table III were not necessarily the strengths of the respective cement bonds. It is necessary to take into account the locations of the rupture when analyzing these data. The breaking strengths of the specimens at room temperature seemed to be that of the stock rather than the strength of the cement bond because the rupture largely occurred in the stock.

After 2 hours in air at 212°F. the average breaking strength of the chlorinated rubber specimens reflected the strength of the cement bond since rupture occurred almost entirely in the bond. On the other hand the average breaking strength of the phenolic resin specimens subjected to this treatment was the strength of

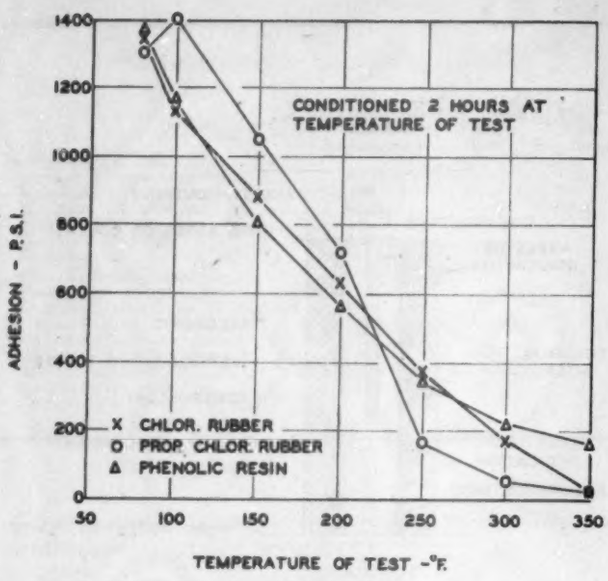
CONDITIONED 2 HOURS AT TEMPERATURE OF TEST
ADHESION - P.S.I.
TEMPERATURE OF TEST - °F.
X CHLOR. RUBBER
O PROP. CHLOR. RUBBER
Δ PHENOLIC RESIN

FIG. 3 — Effect of conditioning for two hours at elevated temperatures.

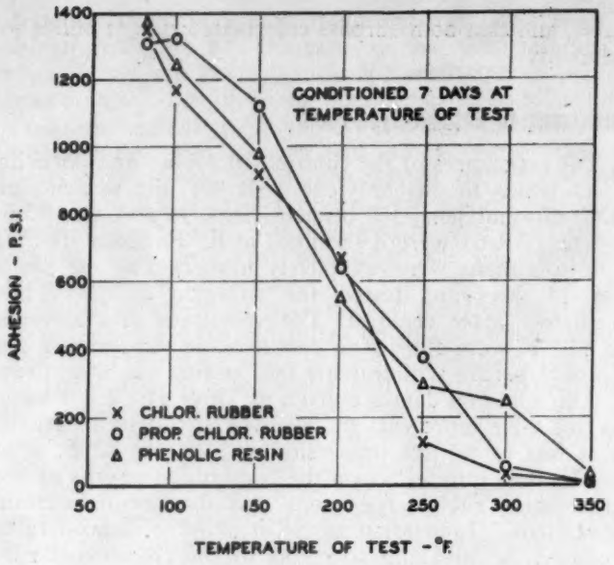
CONDITIONED 7 DAYS AT TEMPERATURE OF TEST
ADHESION - P.S.I.
TEMPERATURE OF TEST - °F.
X CHLOR. RUBBER
O PROP. CHLOR. RUBBER
Δ PHENOLIC RESIN

FIG. 4 — Effect of conditioning for seven days at elevated temperatures.

the stock since rupture occurred almost entirely in the stock. It is surprising and somewhat confounding that the respective average breaking strengths obtained with the chlorinated rubber and phenolic resin specimens were practically the same in spite of the different locations of rupture.

After 7 days in air at 212°F. the strengths of both cement bonds clearly exceeded the strength of the stock. However, after 7 days in boiling water the chlorinated rubber bond was stronger than the stock whereas the phenolic resin bond was weaker than the stock. Chlorinated rubber cement therefore appears to be a somewhat better choice than phenolic resin cement for bonding nitrile stocks to steel when immersion in hot water is a service condition for the vulcanized item.

Effect of Elevated Temperatures

The effects of elevated temperatures on chlorinated rubber, proprietary chlorinated rubber and phenolic resin bonds were determined using the cylindrical oven described above. The temperatures at which tests were performed were 82, 100, 150, 200, 250, 300 and 350°F. At each temperature above 82°F. one set of 6 specimens was conditioned for 2 hours before testing and one set of 6 specimens was conditioned for 7 days before testing. The latter conditioning was done in a forced-draft oven. Each specimen was transferred to the cylindrical oven at least 30 minutes before testing. The results of the tests at elevated temperatures are given in Table IV and are graphed in Figures 3 and 4.

The tabulated data show more clearly the relative qualities of the bonds than do the graphs because a knowledge of the location of the rupture is as important as the breaking strength for determining the effectiveness of the bonding agents. The rupture of the phenolic resin specimens took place mostly in the stock at all temperatures, even after 7 days conditioning. The same was true for the chlorinated rubber and proprietary chlorinated rubber specimens at temperatures below 250°F., but above 250°F. these specimens tended to break in the cement bond.

It was observed that the chlorinated rubber layers in the test specimens had changed from colorless to red-orange after 7 days at 250°F. and to brick red after 7 days at 300 or 350°F. Even the black proprietary chlorinated rubber layers showed some red color after 7 days at 350°F. These color changes indicated decomposition of the bonding agent.

In view of this instability of chlorinated rubber bonding agents at elevated temperatures, it appears that phenolic resin cement is a better choice than the chlorinated rubber or proprietary chlorinated rubber cements for bonding nitrile rubber stocks to steel when the bonds are to be subjected to high temperatures in service.

(Continued on page 96)

TABLE IV—EFFECT OF ELEVATED TEMPERATURES

Temperature of Conditioning and Testing °F.	Chlorinated Rubber Bond				Proprietary Chlorinated Rubber				Phenolic Resin Bond			
	2 Hours [1]		7 Days [1]		2 Hours		7 Days		2 Hours		7 Days	
	Load psi [2]	% in Cement [3]	Load psi	% in Cement	Load psi	% in Cement	Load psi	% in Cement	Load psi	% in Cement	Load psi	% in Cement
82	1354	20	1354	20	1305	25	1305	25	1374	15	1374	15
100	1140	60	1173	35	1406	15	1323	15	1171	10	1236	10
150	877	30	921	20	1052	55	1119	35	808	5	977	0
200	627	35	673	0	716	100	639	0	562	0	548	5
250	364	100	126	65	170	85	374	5	354	0	299	0
300	173	70	45	95	60	100	48	100	223	5	249	0
350	27	100	0.5	100	27	100	8	100	170	50	32	5

[1] Conditioning time. [2] Load at rupture. [3] Estimated percentage of area of rupture that was within the cement bond. Remaining area of rupture was within stock.

Stability of Accelerators as Affected by High Processing Temperatures

By F. L. HOLBROOK and T. H. FITZGERALD

Naugatuck Chemical Div., U.S. Rubber Co., Naugatuck, Conn.

HIGH speed processing of rubber compounds appears to be gaining widespread acceptance in the rubber industry. In general, this is typified by compounding in Banbury mixers operating at 40 r.p.m. Such drastic working naturally develops high stock temperatures which may easily reach the level of 360°F.

From an economic standpoint, it is desirable to introduce the acceleration into the Banbury during the latter part of the mixing cycle. In certain instances where this has been done, there have been reports from the field of a loss in accelerator activity. In view of this, a study was undertaken to determine what, if any, might be the adverse effects of processing temperatures of the order of 360°F. upon the stability of representative and commonly used accelerators.

A total of twenty-two accelerators or accelerator combinations were examined. These were picked to include the more widely used representatives of the five major accelerator classifications, namely, thiazoles, thiurams, dithiocarbamates, guanidines and aldehydeamines.

Procedure

The testing was done in natural rubber compounds and for the most part in a typical tread type stock. In the case of certain of the aldehyde amines a non-black mix was used because of the known retarding action of channel black upon these particular materials. Recipes were as follows:

TEST RECIPES

Tread Type		*Non-black*	
Smoked Sheets	100.0	Smoked Sheets	100.0
Zinc Oxide	5.0	Zinc Oxide	5.0
MPC Black	45.0	Whiting	50.0
Fatty Acid	3.5	Fatty Acid	0.5
Pine Tar	3.5	Light Process Oil	3.0
Antioxidant	1.0	Antioxidant	1.0
Sulfur	3.0	Sulfur	3.0
Accelerator	as desired	Accelerator	as desired

Mixing was carried out in a size B laboratory Banbury operating at 116 r.p.m. and with enough steam in the jacket to develop a stock temperature of 360° F. ± 5° F. as determined by a needle pyrometer thrust into the batch immediately after discharge.

Each accelerator or combination was added to duplicate batches having identical formulae and mixing cycles but with differences in time and manner of accelerator addition (Fig. 1). In the one instance, the accelerator was introduced into the Banbury two minutes before completion of the mix and thus subjected to the high temperatures generated (360°F.). In the second instance, addition was after the Banbury operation and

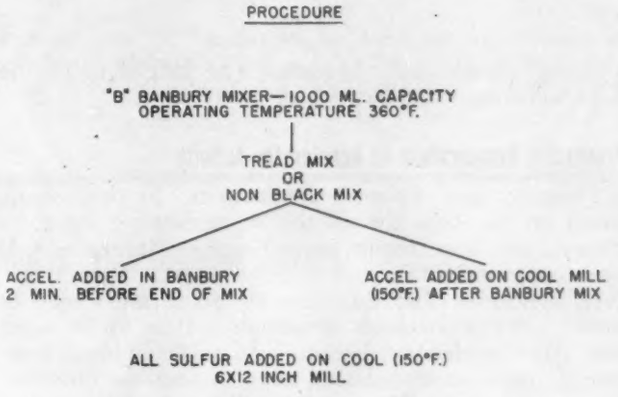

Figure 1

while the batch was being worked on a 6 x 12 inch sheeting mill with roll temperatures of 150°F. It was felt that under these latter conditions, batch temperatures would be insufficient to cause impairment of accelerator activity and in the case of each material, performance could be considered as standard.

Change in accelerator activity as affected by processing temperatures was based on differences in physical properties after vulcanization which were found to exist between a standard batch and that in which the same accelerator was added during the high temperature Banbury mixing.

Specifically, A.S.T.M. test slabs of each stock, cured for 30, 45, 60 and 75 minutes, respectively, were prepared.* The average tensile strength, 300% modulus, breaking elongation and T-50 values for all four cures on any one stock were determined. The results have been expressed as percent retained or average change in property as between standard and "hot" Banbury accelerator addition. Indications of impairment of accelerator activity are a drop in the level of tensile and modulus values and positive average change in T-50 and

TABLE I—COMPARATIVE STABILITY OF THIAZOLES IN A TREAD STOCK
(Banbury Processed at 360°F.)

Accelerator	Amt.	Retained Tensile	Retained Modulus	Average Change T-50	Average Change Elong.
2-Mercaptobenzothiazole	1.0	101.5%	94%	+3.0° C.	+3.0%
Benzothiazyl disulfide	1.0	103.0	92.8	—0.9	+6.0
Phenylaminomethyl benzothiazyl sulfide	1.0	104.6	93.8	+3.1	+4.0
N-Cyclohexyl benzothiazylsulfenamide	0.5	97.0	77.0	+2.5	+7.0

Presented before the Division of Rubber Chemistry at the 113th Meeting of the American Chemical Society, Chicago, Ill.

* Temperature of vulcanization 274° F.

TABLE II—COMPARATIVE STABILITY OF ACTIVATED THIAZOLES IN A TREAD STOCK
(Banbury Processed at 360°F.)

Accelerator	Amt.	Retained Tensile	Retained Modulus	Average Change T-50	Average Change Elong.
Benzothiazyl disulfide ..	0.5	105.7%	88.0%	+4.8° C.	+4.2%
Diphenylguanidine	0.25				
Benzothiazyl disulfide ...	0.625	106.2	84.5	+4.0	+8.0
Tetramethylthiuram monosulfide	0.0625				
Benzothiazyl disulfide ...	0.5	97.2	86.2	+4.1	+11.0
Diphenylguanidine phthalate	0.35				
2-Mercaptobenzothiazole..	1.0	90.0	93.5	+4.2	+5.0
N-Nitrosodiphenylamine..	0.5				
N-Cyclohexyl benzothiazyl sulfenamide....	0.25	94.0	86.7	+3.5	+2.0
Bis-N,N' (2 benzothiazylthiomethyl) urea	0.35				

breaking elongations. Modulus was judged to be the most sensitive indicator.

Processing Temperature vs Accelerator Activity

Thiazoles and Thiazole Derivatives: In this group, based on the behavior of the representative members chosen, any impairment in accelerating strength from processing at 360°F. is considered slight. It is, therefore, concluded that this class of accelerators may be safely used under such conditions. It is to be noted that the N-cyclohexyl benzothiazyl sulfenamide did appear to have somewhat less stability than the other accelerators tested. The results are shown in Table I.

Activated Thiazoles: In this group in which a thiazole is used as the primary accelerator it is seen that slightly more impairment has resulted from the high temperature processing than in the case of the straight thiazole. To some extent this may be due to impairment of the secondary accelerator. The group is considered generally suitable for use in high temperature processing. The results are shown in Table II.

Dithiocarbamates: With the dithiocarbamates the effects of high temperature (360°F.) processing are quite damaging. It is of interest to note that the extent of the damage varies inversely with the chain length of the alkyl radicals on the nitrogen atom in the molecule. Thus the zinc dimethyl dithiocarbamate and the benzal bis dimethyl dithiocarbamate show nearly 60% loss in both tensile and modulus while for the zinc diethyl and selenium diethyl bodies the loss is only 35 to 40%. Proceeding to the zinc dibutyl dithiocarbamate, it is found to be affected less than 10%. The results are shown in Table III.

Thiurams: Heavy damage also occurs in this group at processing temperatures of 360°F. This would be expected from the close chemical relationship to the dithiocarbamates. Likewise, the tolerance of high temperature seems to improve in going from the mono to the disulfide or with an increase in weight in the alkyl substitution on the nitrogen atoms in the molecule. Thus, tetramethylthiuram monosulfide was found to lose significantly more of its accelerating value than the tetramethylthiuram disulfide while the tetraethylthiuram disulfide loses still less. None of these three accelerators appears to fall within the range considered satisfactory for high temperature processing. Results are shown in Table IV.

TABLE III—COMPARATIVE STABILITY OF DITHIOCARBAMATES IN A TREAD STOCK
(Banbury Processed at 360°F.)

Accelerator	Amt.	Retained Tensile	Retained Modulus	Average Change T-50	Average Change Elong.
Zinc dimethyl dithiocarbamate	0.2	44.0%	39.5%	+19.4° C.	+11.0%
Zinc diethyl dithiocarbamate	0.2	71.8	68.8	+19.9	+ 5.0
Zinc dibutyl dithiocarbamate	0.3	95.6	90.5	+ 5.9	+ 2.0
Selenium diethyl dithiocarbamate	0.2	64.0	60.8	+18.0	+ 7.0
Benzal-bis dimethyl dithiocarbamate	0.3	44.5	41.3	+26.8	+ 9.0

TABLE IV—COMPARATIVE STABILITY OF THIURAMS IN A TREAD STOCK
(Banbury Processed at 360°F.)

Accelerator	Amt.	Retained Tensile	Retained Modulus	Average Change T-50	Average Change Elong.
Tetramethylthiuram monosulfide	0.2	65.3%	39.8%	+24.7° C.	+11.0%
Tetramethylthiuram disulfide	0.2	78.4	55.5	+20.8	+ 7.0
Tetraethylthiuram disulfide	0.3	85.4	72.6	+20.0	+ 2.0

While the loss of accelerating strength is probably a function of both time and temperature, it is felt that for practical purposes it may be considered as dependent on temperature only. No significant improvement in retention of properties of the tetramethylthiuram monosulfide compound resulted in reducing the time of exposure to the high temperature in the Banbury from two minutes down to one minute. A substantial improvement was obtained, however, by reducing the mixing temperature from 360°F. to 300°F. Probably the safe upper limit for processing the thiurams would be in the neighborhood of 275°F.

Miscellaneous Amine Accelerators: This group consisted only of butyraldehyde-aniline and diphenylguanidine. In a tread stock both of these dissimilar accelerators were classified as intermediate with respect to stability during high temperature processing. This possibly suggests that the best application might be that of activators for more stable accelerators. Results are to be found in Table V.

Aldehydeamines: As mentioned previously the aldehydeamines studied were compared in a non-black stock because of the known retarding action of channel black on some of them. None of the three tried showed significant loss in activity when processed at 360°F. Butyraldehyde-aniline was found the most tolerant of high temperature. Both heptaldehyde-aniline and triethyl trimethylene triamine, while affected somewhat more, are considered to have satisfactory stability. Results are in Table VI.

Summary

In high speed Banbury mixing, temperatures may be generated at sufficiently high levels to at least partially

TABLE V—COMPARATIVE STABILITY OF MISCELLANEOUS AMINE ACCELERATORS IN A TREAD STOCK
(Banbury Processed at 360°F.)

Accelerator	Amt.	Retained Tensile	Retained Modulus	Average Change T-50	Average Change Elong.
Butyraldehyde-Aniline ...	1.0	83.8%	74.0%	+3.0° C.	+4.0%
Diphenylguanidine	1.75	93.5	78.4	+5.2	+1.0

damage some rubber accelerators and decrease their effective activity. Thus, at a processing temperature of 360°F., the following stability relationships hold:

1. Thiazoles, thiazole derivatives and activated thiazoles show little loss of activity.
2. Thiurams and dithiocarbamates may be severely affected.
3. Guanidines as represented by diphenylguanidine are only moderately affected.
4. Aldehydeamines range in stability from moderate to good.

This effect of high temperature on accelerator stability may be considered as constituting a processing hazard.

The proper selection of accelerators and the careful consideration of any processing changes which may significantly increase temperature will minimize the danger and allow avoidance of harmful results.

The fact that some accelerators are relatively unstable at high temperatures does not preclude their use. It is simply necessary to incorporate these materials into the mix at a sufficiently low temperature such as that at which it is normally considered safe to add sulfur.

TABLE VI—COMPARATIVE STABILITY OF ALDEHYDE-AMINES IN A NON-BLACK STOCK

(Banbury Processed at 360°F.)

Accelerator	Amt.	Retained Tensile	Retained Modulus	Average Change T-50	Average Change Elong.
Butyraldehyde-Aniline ...	0.75	100.2%	100.5%	+1.0° C.	+2.0%
Heptaldehyde-Aniline	0 35	90.1 •	90.2	+3.4	+8.0
Triethyl trimethylene triamine	1.0	100.2	93.8	+0.8	+4.0

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Cast Phenolics for Rubber Molds and Dipping Forms

AN INTERESTING development involving the use of cast phenol formaldehyde resins for latex dipping forms and molds suitable for casting rubber has been initiated by the firm of Nucas, Ltd., Slough, England, according to a recent issue of *Plastics (London)*. The process is of particular interest at present because of the difficulty of obtaining glass and porcelain forms and the shortage of suitable hardwoods.

One of the major limitations of orthodox cast phenolic resins has been the tendency for dimensional change. Because of this factor their use for most precision work has been fairly limited. By using an appropriate filler and curing cycle, the British firm has been said to overcome this problem and to have reproduced a variety of shapes on which shrinkage was accurately predetermined and dimensions preserved after long cyclical treatment at 90° C. and more.

The facility with which a black color can be produced in the castings ensures that maximum efficiency is obtained when infra-red is employed as a heating medium. The ability of orthodox cast resins to take high lustre, via the buffing wheel, is exploited to the full in the process. A finish comparable to that of polished glass is reported to be readily obtained, and the smooth, pit-free inert surface becomes an ideal latex-forming medium.

Being resistant to most acids and unaffected by humidity or atmospheric corrosion, phenolic products may be safely employed for a variety of specialized purposes. If required, the composition can be modified to be completely inert to caustic solutions of any strength. To produce a desired form in quantity, a prototype in metal, wood, cast resin or other material is first prepared. For less accurate purposes plaster may be used. A mold is taken from the prototype and castings are then produced in the usual manner. By employing polyvinyl chloride-type or elastomer molds, a finished article can be taken direct from the mold. If a super finish is required, buffing and polishing can be employed as a final operation.

Just as these accurate dipping forms can be made, so also can molds be manufactured. As the cast resin is dimensionally stable, metal locking pins, threaded inserts and ejectors can be incorporated in any desired location. Properties of heat resistance and chemical inertness make such molds ideal for many rubber and polyethylene molding applications. Advantages claimed for the method include low cost and speed with which the molds can be made.

Can Wood Be Covered with Rubber?

THE question of the possible covering of wood with rubber was recently submitted to a rubber expert who replied: "Not to any large extent . . . adhesion is somewhat difficult . . . with latex covering, the wood absorbs the moisture and blows during vulcanization."

Despite the above reply, it is the belief of many that a way will be found in which to cover wood with rubber successfully, especially now that so many tailor-made synthetic rubbers are available. Perhaps it has already been accomplished. Rubber technologists are working hard and fast these days.

In this connection it is reported that one of our scientists has made careful computations and has discovered that, according to present formulas, a bumble bee cannot fly. The wing area of a bumble bee is not sufficient to support its great weight in flight. Yet, despite that scientific discovery, bumble bees are flying all around us, and having a good time demonstrating that "it can be done." Likewise it will eventually be demonstrated by somebody that wood can be covered with rubber.

Instron Tensile Testing Instrument

The Instron Tensile Tester, a new, high-precision electronic testing instrument that makes possible the testing of rubber, plastic films, coated materials, adhesives, and similar fibrous or non-fibrous specimens, over a wide field of test conditions of load and speed, has been introduced by the Instron Engineering Corp., 2 Hancock St., Quincy 71, Mass. By virtue of the versatility of the controls, both for changing the sensitivity

of the load recording system and for operating the motion of the pulling jaws, a variety of testing techniques is available for the determination of special properties.

The instrument utilizes a precision electronic weighing system for detecting and recording the load applied to the sample under test. The pulling jaw is operated by a unique drive that provides an absolutely controlled rate of elongation of the sample, over a wide range of speeds and in either direction of travel, and with instant reversibility. The chart of the high-speed recorder is driven at various speed ratios with respect to the pulling jaw, so that tensile load-elongation curves of the material are made accurately, at constant rate of elongation.

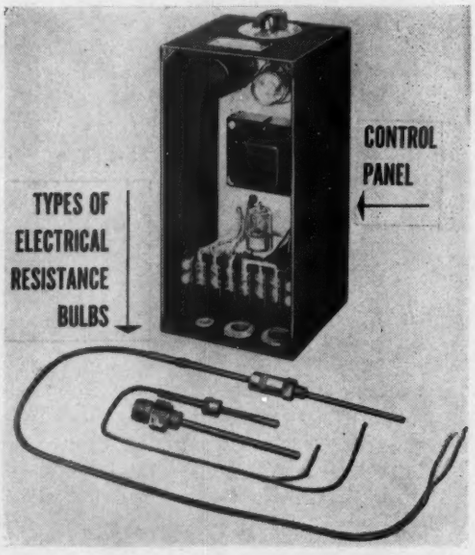
The pulling jaw of the instrument is mounted on a movable crosshead which is operated vertically by means of twin screws in a special design to eliminate backlash. The main power to actuate the pulling crosshead is derived from a servocontrolled amplidyne drive acting as a "positional follow-up" system. By this means, a low-power reference unit, which is driven synchronously at various speeds through a set of light change-gears, is able at all times to determine the position of the movable jaw. Likewise, instantaneous starting, stopping, and reversal of direction of travel of this jaw is effected through fast-acting computer-type magnetic switches operating on the reference unit. Therefore, inasmuch as almost no lag or error is introduced at reversal, this system enables measurements to be made of hysteresis under cyclic conditions with accurate correspondence between head position and chart travel being maintained at all times.

Operation of the pulling head is controlled by push buttons, located on the right side of the unit, which start, stop, or quickly reverse the motion of the movable jaw. The operation can be made automatic by a set of adjustable, close-tolerance switches, which control the gage length, the cycling points, and other functions. Emergency stops are provided which will automatically stop the machine at the extreme ends of crosshead travel to prevent damage to the equipment.

Standard jaw speeds are provided extending from 0.02 to 20 inches per minute in twelve steps. Change of speeds is effected easily through the use of light gears located in an accessible compartment on the control panel, in conjunction with a shift lever conveniently located on the right side of the instrument. Rapid traverse controls are available for quickly moving the crosshead from one position to another, or for returning the head to the correct established gage length after a previous test has been completed.

Edison Electronic Temperature Controller

A temperature controller, said to be simple, fast, and precise, has been developed by the Instrument Division of Thomas A. Edison, Incorporated, West Orange, New Jersey. The device uses a single electronic tube with an electrical resistance type bulb for thermal pick-up and is of the on-off type. The use of the resistance bulb permits location of the sensing element at a point remote from the control panel and eliminates the necessity of thermal compensation. This device, which is non-indicating, may be used to control temperatures to close



tolerances in solids, gases, or liquids. Units are available to cover the temperature range from —100°F. to 1200°F. and are adjustable within a range of several hundred degrees.

Supply voltage may be 115 or 230 volts 50-60 cycle alternating current. Load capacity is 30 amperes at 115 volts, 20 amperes at 230 volts. Accuracy of the controller is independent of usual voltage variation. Normal response time is under three seconds, due to the patented bulb construction. A 5" x 5" x 10" control panel, weighing less than 8 lb., complete, is furnished and is provided with conduit knockouts and a rugged terminal board. This may be located at any convenient place and at considerable distance from the temperature zone.

Drying and Curing of Carpet Backing Compounds

A SINGLE gas burning, direct-fired space heater, used with a unique system of ductwork, provides six different kinds of heating and ventilating conditions at the New York plant of the Devoncraft Corporation, finishing division of the Duraloom Carpet Mills, Inc. The versatile system, designed by M. H. Shorago, Devoncraft vice-president and general manager, is used for the following:

1. Space heating the entire plant, which contains approximately 12,000 sq. ft. of floor space.
2. Ventilating the factory during the summer, using 100 per cent makeup air.
3. Heating 100 per cent makeup air during the winter for drying neoprene base compound that is applied to the back of loop weave broadloom decorator type carpet.
4. Bringing in fresh, warm air during the summer for drying the backing compound. (For this operation, only the fans in the heater are used.)
5. Curing the neoprene compound by increasing temperature in the drying and curing room to 200° F.
6. Purging the drying and curing room of heat and fumes after the curing process.

Operation of the system has proved to be highly successful for drying and curing the carpet backing compound, a patented development of the company. Because a temperature of 200° F. can be built up in the drying and curing room, processing time is only two hours. In addition, the system supplants five suspended unit heaters and ten radiators that were previously used for space heating the factory.

The vital part of the unusual heating-ventilating arrangement is a gas-fired Dravo Counterflo Heater, a product of the Dravo Corporation, Neville Island, Pittsburgh, Penna. It has a capacity of 500,000 Btu per hour and can handle approximately 5,500 cu. ft. of heated or unheated air per minute, discharging it at a velocity of 2,000 ft. per minute.

Description of Drying Room

The drying and curing room is 50 ft. long, 24 ft. wide and 14 ft. high. The ceiling of the room has been built up to form a double dead air space under the cement roof. This was accomplished by installing aluminum insulation along the bottom of the concrete joists, attaching 2-in. x 4-in. nailing strips and then 3/8-in. asbestos board. All cracks were sealed and the ceiling was painted with aluminum paint. Cinder block walls on three sides of the ceiling were sealed with sodium silicate and given a prime coat of paint and a finish coat of aluminum. A partition wall dividing the drying room from an adjoining 28-ft. long storage room, where the heater is located, also is doubly insulated and painted aluminum.

A sheet metal duct 34 ft. long extends along one side of the room at ceiling height. It is connected to a small plenum chamber built around the three discharge nozzles on top of the Dravo heater. The duct is graduated in size, from 41-in. x 12-in. nearest the plenum chamber to 10-in. x 12-in. at the end to achieve uniform velocity of discharge horizontally across the room. There are 16 discharge ports, each 8-in. long and spaced on 2-ft. centers, in the duct.

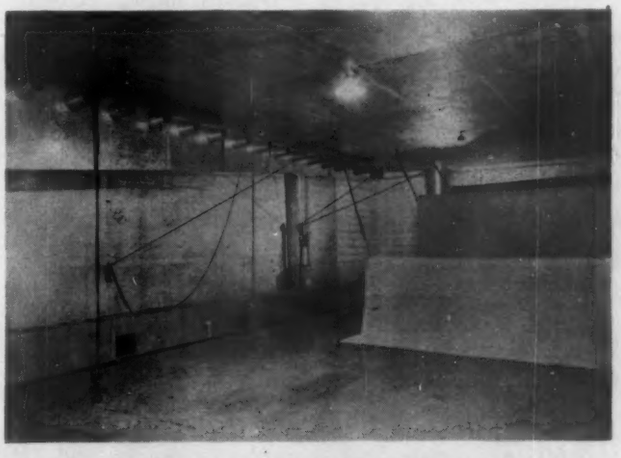
At floor level, directly below the supply duct, there is another duct 20-in. by 12-in. running the full length of the room. This duct has five inlet grills, each 10-inches high. Two are 16-in. wide, one 14-in., one 12-in. and one 10-in. The duct is arranged to carry air from the room back to the heater or, when necessary, to exhaust it to the outside through the roof. A 5600 cfm. fan is located in the roof exhaust stack.

A 16-in. x 18-in. fresh air duct carries makeup air into a plenum chamber built at the base of the heater. The return air duct from the drying room empties into the same chamber. One end of the chamber is fitted with a removable plate to provide inlet for air recirculated from the factory during comfort-heating periods.

Applying the Backing Compound

After the Duraloom carpet has been woven, rolls of it are taken into the drying room where the special neoprene backing compound is applied. The carpet then is draped on hangers suspended from the ceiling by a pulley arrangement for drying and curing. About 160 lineal feet of carpet can be processed in one operation. Drying removes moisture from the compound as well as the carpet.

For the drying operation, 100 per cent makeup air is used. The return air damper in the floor level duct is closed and the damper at the other end of the duct is



View of the drying and curing room in the Devoncraft plant. Walls and ceiling are heavily insulated. Temperature of 200° F. is built up in the room by 100 percent recirculation of warm air. Air is discharged through ports in the overhead duct and returned to heater through floor level duct.

opened to exhaust all moisture-laden air. Because the Dravo heater has a stainless steel combustion chamber that permits rapid transfer of heat from flame to air, temperature of the fresh air drawn into the heater is increased about 70° within a matter of seconds.

If the outdoor temperature is sub-zero, however, dampers on the return air duct are adjusted to bleed in a small amount of air from the room. When the desired temperature is reached, all of the moisture-laden air is exhausted. During the summer, when outside air is hot and dry, only the fans in the heater are operated for the drying process.

For the curing operation, the heater burner is ignited. In curing the neoprene base backing compound, high temperatures are built up gradually within the drying room. All fresh air supply is blocked off by closing the damper in the makeup air duct. The exhaust air damper also is closed. The heater then is operated on 100 per cent recirculated air. This increases temperature in the drying room to 200° F. The heater is designed to raise temperature of the intake air approximately 70°. Therefore, each time air is recirculated over the combustion chamber of the heater, it picks up additional heat. The cycle continues until desired temperature of 200° is reached. After curing, the room is purged by operating the heater for a short time on 100 per cent makeup air and 100 per cent exhaust.

For comfort space heating, the Dravo unit is operated on 100 per cent recirculated air. Heated air flows through ducts into the other rooms. The panel on the makeup air plenum chamber in the heater room is removed to aid recirculation. The velocity of return air flow is not high but sufficient quantities of air near floor level are drawn back to the heater to achieve effective space heating.

This unusual system, according to Mr. Shorago, not only has solved the process heating problems, but has established a high degree of comfort in the factory working area. Moreover, fuel consumption is more economical than the previous system which was used for space heating only. Hot water for the old radiators and the overhead unit heaters had been supplied from an oil-fired boiler. Now, the entire heating plant is consolidated in the single Dravo unit. Control of the heater is automatic by means of room air thermostats.

The duct dampers are operated manually, since the length of the process heating periods have to be determined by experienced personnel. The company, however, is working on a method to operate the dampers during the drying process by means of humidistats.

Report on Rubber Production in Brazil

BASED on unofficial estimates obtained from the Rubber Credit Bank, the U. S. Department of Commerce estimates the production of natural rubber in Brazil for 1948 at approximately 27,600 net metric tons. Of this total, 98 percent is expected to be produced in the Amazon Valley and the remainder in other Brazilian areas, including the states of Mato Grosso, Piaui, and Bahia. Brazilian rubber production in 1947 totaled 32,931 tons.

Based on purchase figures obtained from the Rubber Credit Bank, and export figures obtained from exporters of rubber released from the existing Government market monopoly, Brazilian production of natural rubber during May, 1948, amounted to 1,683 net metric tons as compared with 3,807 tons produced in the preceding month and 3,276 in May, 1947. Approximately 94.3 percent of the total May production came from the Amazon Valley and the other 5.7 percent from other areas in Brazil. The substantial decreases of about 55.8 percent and 48.6 percent, respectively, from the April, 1948, and May, 1947, production may be attributed to changes in the purchase policy of the Rubber Credit Bank since the beginning of this year.

Data on Shipments

Shipments of natural rubber from all of the producing areas to southern Brazil during May, 1948, totaled 2,405 net metric tons as compared with 669 tons shipped during the preceding month and 2,979 shipped during May, 1947. Stocks of natural rubber held by the Rubber Credit Bank at the end of May, 1948, amounted to 8,603 net metric tons at exporting points, and 3,998 at consuming points in Brazil. Stocks of natural rubber held at the end of the preceding month totaled 13,295 tons.

Estimated Brazilian production of 140 tons of reclaimed rubber per month is reported to continue unchanged. Practically all reclaimed rubber is produced and used by manufacturers of rubber products in their own operations.

New regulations have been issued governing the sale of Brazilian rubber to domestic manufacturers of rubber products. The quantities which will be used in products for export will be sold at world-market prices.

In order to sustain the economy of the Amazon region, rubber goods manufacturers heretofore have been obliged to purchase domestic rubber at prices approximately three times the world-market quotations. This requirement has precluded the production of rubber goods for export and has cut down the output for home use.

Method of Purchasing

According to the new regulations, the manufacturer will continue to buy rubber from the Central Rubber Bank, but if he specifies that it is to be used in the manufacture of products for export, he will pay for the particular grade of rubber he buys the price quoted in the New York Commodity Exchange on the day the application is filed with the Executive Commission for Rubber Protection; the official rate of exchange on the date of application will be used to convert the quotations to Brazilian currency.

Although the measures taken are believed to have been carefully planned by the Commission, it is the general opinion of rubber goods manufacturers that the new regulations will have no immediate effect on the industry. Tire and tube manufacturers, it is said, undoubtedly could compete with other suppliers on the world market, but the Bank of Brazil would be reluctant to issue export licenses on tires and tubes until the domestic supply situation has improved considerably. Technical difficulties in the issuance of export licenses and the procurement of corresponding import licenses from other countries would also delay the export of other rubber manufacturers.

Division of Rubber Chemistry, A. C. S., Meets in Detroit on November 8, 9, 10

THE FALL MEETING of the Division of Rubber Chemistry, A.C.S., as previously announced, will be held at the Book-Cadillac Hotel in Detroit, Mich., on Monday, Tuesday and Wednesday, November 8, 9 and 10. The first session will get under way on Monday afternoon, November 8, and the concluding session will be held on Wednesday morning, November 10.

The meeting will feature the presentation of twenty-two technical papers, once again grouped insofar as possible by subject matter. The regular business meeting will be held at the end of the technical session on Tuesday morning, November 9, and the divisional banquet will be held on the evening of the same day. All events, including the banquet, will be held at the Book-Cadillac Hotel. The suppliers' cooperative cocktail party, which has been a feature of the past several meetings, will not be held at Detroit.

Titles and abstracts of the twenty-two papers to be presented, together with their authors and company connections, follow:

Program of the

DIVISION OF RUBBER CHEMISTRY
AMERICAN CHEMICAL SOCIETY

Book-Cadillac Hotel, Detroit, Michigan
November 8-10, 1948

Monday Afternoon—November 8

2:30 P.M.—Opening remarks by Harry E. Outcault (St. Joseph Lead Co.), Division Chairman.
2:40 P.M.—Technical Papers.

Tuesday Morning—November 9

9:00 A.M.—Technical Papers.
11:20 A.M.—Business Meeting.

Tuesday Afternoon—November 9

2:00 P.M.—Technical Papers.

Tuesday Evening—November 9

6:30 P.M.—Division Banquet, Book-Cadillac.

Wednesday Morning—November 10

9:15 A.M.—Technical Papers.

ABSTRACTS OF PAPERS

Monday Afternoon—November 8

2:40 P.M.—EPC Channel Blacks Modulus Study. *J. Q. McGiffin (General Tire & Rubber Co., Baytown, Texas).*

A total of 88,700,000 pounds of EPC channel black has been used for the production of GR-S Black masterbatches at the Office of Rubber Reserve plant operated by the General Tire and Rubber Company at Baytown, Texas, during the 30-month period from January 1, 1946, through June 30, 1948. A total of 50,600,000 pounds of the above EPC channel black has been tested on a dry mill mix basis, by incorporation of 50 parts of channel black, taken from representative covered hopper car sampling, with 100 parts of standard GR-S reference control, with completion of compounding, curing, and tensile testing according to Office of Rubber Reserve specifications. Data accumulated represent testing on 767 hopper cars of EPC channel black.

Data are reported representing five different producing companies and sixteen different fields identified only by Roman numerals and capital letters, respectively. Results are reported for 25 and 50-minute modulus in p.s.i. at 292°F. at 300% elongation and compounded Mooney viscosity (4′ ML). These data have all been corrected for individual simultaneous reference control testing and have then been corrected to one common reference control level. Factual results only are reported as a matter of record and to present this information to the industry as a whole.

3:05 P. M.—An Acceleration Study Using Reinforcing Furnace Blacks in Natural Rubber Treads. *W. H. Heinlen, Jr. (B. F. Goodrich Chemical Co., Cleveland, Ohio).*

Reinforcing furnace blacks as replacements for channel blacks in natural rubber tread formulations are receiving increased interest throughout the industry. The major difficulty encountered in their use has been a definite processing scorch problem introduced by their inherent high pH and consequent low accelerator adsorption values. Reduction of common accelerators and/or sulfur loadings to various degrees of starvation, improves scorch resistance to some extent, but only at the expense of hysteresis, set, and other important properties in the vulcanizates.

Further expansion in the use of these furnace blacks is justified by the data of this study in which mixed aliphatic thiazyl disulfides are used for acceleration in combination with n-nitroso diphenyl amine for retardation. With this accelerator combination, adequate freedom from scorch is achieved without detriment to other important physical properties in the vulcanizate. The effect of a concentration range of both sulfur and retarder is shown and comparisons are made with a standard E.P.C. tread stock used as a control. The R.F. black vulcanizates are shown, by all physical tests, equal to and in many ways superior to the similarly loaded E.P.C. black control compound.

3:30 P. M.—Power Consumption Studies on Natural and Synthetic Rubber Compounds. *A. H. Nellen, W. B. Dunlap, Jr., and C. J. Glaser, Jr. (Lee Tire & Rubber Corp., Conshohocken, Pa.).*

A power study has been made on a "B" size laboratory Banbury and a standard No. 11 Banbury. The study was made primarily to determine the effect of X-435 polymer (41° cumene-hydroperoxide) on power requirements. The work has been amplified to include the effect of certain standard types of carbon black and plasticizer-black ratios and finally the effect of mixing variables.

It was found that X-435 requires more power than GR-S in approximate relationship to its higher Mooney value and that types of black have a pronounced effect on power consumption, not necessarily in order of their respective particle size, but apparently depending on the type of hydrocarbon in which they are used.

Power requirements of certain type tread mixes exceed the capacity of some existing equipment imposing severe repeated overloads. Judicious blending of blacks may be used successfully to reduce these overloads. The effect of black-plasticizer ratio is shown and various mixing methods which will reduce power consumption are discussed.

3:55 P. M.—The Effect of Compounding Variables upon the Low Temperature Behavior of Butadiene-Styrene Synthetic Rubbers. ***R. D. Juve and J. W. Marsh (Goodyear Tire & Rubber Co., Akron, Ohio).***

The serviceability of butadiene-styrene synthetic rubber stocks at low temperatures is dependent upon the compounding materials used. The type and amount of plasticizer is of particular importance. Data are shown for the changes in stiffness at various low temperatures for GR-S containing a number of good low temperature plasticizers.

A comparison was made of the low temperature stiffening of polybutadiene containing the thermatomic P-33 black and easy processing channel black. Improvement in the low temperature flexibility of GR-S without too great a deterioration of physical properties at normal temperatures can be achieved by the use of combinations of increased black and increased plasticizer.

The degree to which polybutadiene and 85-15 butadiene-styrene compounds are vulcanized has an important relation to the permanent set which the stocks assume after static compression at minus 57°C. The tensile and elongation at minus 42°C. and at minus 57°C. have been investigated for several stocks of varied freezing points.

4:15 P. M.—The Compounding of O-Ring Hydraulic Packings. ***Richard A. Clark and LaVerne E. Cheyney (Battelle Memorial Institute, Columbus, Ohio).***

This paper discusses some of the general and specific requirements for O-ring hydraulic packings and presents some aspects on the compounding of O-rings to meet these requirements. Such packings are widely used in aircraft, automobiles, locomotives, hydraulic presses, and many other pieces of equipment and machinery employing hydraulic methods of motivation or activation. Aircraft applications represent the most severe type of use in general and are discussed in detail in this paper.

The general requirements for an O-ring for aircraft applications are that it should be made to close dimensional tolerances, it should not be adversely affected by the hydraulic oil employed, it should withstand working hydraulic pressures without leakage, it should seal at both high and low temperatures, it should have low friction, and it should have a long life expectancy.

The specific requirements for O-rings, as given in the Army-Navy Aeronautical Specification AN-P-79, are discussed. The tests listed in this specification are classified as tests for control, for the evaluation of O-rings in terms of properties believed requisite for performance, and for simulation of service conditions.

The aspects of compounding O-rings which are discussed include the factors influencing the selection of the base polymer, the curing system, reinforcing agents, and plasticizers.

Tuesday Morning—November 9

9:00 A. M.—Reclaiming Synthetic Rubber. ***F. L. Kilbourne, Jr. (Xylos Rubber Co., Akron, Ohio).***

This paper reviews the progress made by the reclaimed rubber industry from 1938 to 1948 in reclaiming rubber scrap containing synthetic rubber. A quick method of estimating the synthetic hydrocarbon content of an unknown mixture is described. Experiments showing the effect of fine grinding, synthetic rubber content, the use of peptizers and the use of alkaline or neutral digestion media on the reclaimed rubber product are reported. Some statistics illustrating the concentration of synthetic rubber in tire scrap are given. Reports on tire performance obtained with synthetic reclaim are included. Recipes containing synthetic reclaimed rubber are given which are recommended for mechanical goods of varying degrees of Shore hardness.

9:25 A. M.—The Effect of Whole Tire Reclaimed Rubber on the Accelerated Aging of Natural Rubber and GR-S. ***J. M. Ball and R. L. Randall (Midwest Rubber Reclaiming Co., East St. Louis, Ill.).***

Certain specifications for various kinds of industrial rubber goods call for accelerated aging tests. Inasmuch as reclaimed rubber is an important compounding ingredient for such goods it is worth while to know what effect reclaimed may have on the behavior of natural rubber and GR-S during accelerated aging.

Four commercial whole tire reclaims were used: (1) Natural rubber, alkali process; (2) Natural rubber, neutral process; (3) Blend of natural rubber and GR-S, neutral process, and (4) GR-S, neutral process. The third is the predominating type today.

Each of the four reclaims was used in two proportions with both natural rubber and GR-S, replacing 20 and 50 per cent respectively of the new rubber. Control compounds containing no reclaimed rubber were included. Dumbbells cut from press cured slabs were aged 46 and 96 hours in the air oven at 100°C. and also in the oxygen bomb at 70°C., 300 p.s.i.

For maximum resistance to accelerated aging the use of reclaimed rubber with either natural rubber or GR-S may be beneficial. The beneficial effect is often pronounced. A high proportion of reclaim tends to be better for age resistance than a low proportion, and the modern whole tire reclaim containing GR-S hydrocarbon tends to be better than its prewar counterpart.

9:55 A. M.—Reclaiming of Vulcanized Rubber: Rate of Replasticization. ***E. F. Sverdrup, J. S. Plumb, and J. C. Elgin (U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y.).***

A study of the rate of replasticization of vulcanized rubber and some synthetics under simple conditions has been made in an effort to clarify the mechanisms involved in the reclaiming of rubber. It is shown that ground vulcanized rubber heated in the temperature range of 250-400°F. undergoes a rapid initial increase in plasticity and on continued heating passes through an inversion point and rehardens until after prolonged heating a further but slower increase in plasticity is attained. When the cycle described has been completed the normal reclaiming range of four to fourteen hours or more has been reached.

Three points of equal plasticity exist in this time cycle. This behavior is characteristic for all vulcanized rubbers studied but the exact shape and position of the resultant plasticity-time curve, and (the slopes of the various sections of the curve) vary with the rubber, physical conditions and reclaiming agents used. Synthetics show a similar behavior but the rehardening process tends to predominate so that the initial rapid dip in plasticity is less pronounced and is realized only under special conditions. The influence of temperature, plasticizing agent, type of rubber and other factors is reported. Properties of the revulcanized product at various stages of the time cycle have been studied.

The initial replasticization of the scrap may be made to occur in a very short time under suitable temperature conditions, and type and concentration of plasticizing agent. On rapid cooling at this stage the product is a stable and superior reclaim. It is thus found that reclaiming can be effected in relatively short times.

An explanation of the plasticity-time behavior is suggested, and its implications for reclaiming and utilization as the basis for improved reclaiming procedures are discussed. The probable dependence of the relative activity of chemicals as plasticizing agents depending not only on process conditions, but also on the particular stage of the time cycle, is pointed out.

10:25 A. M.—The Effect of Soil Microorganisms on Rubber Insulation. ***J. T. Blake and D. W. Kitchin (Simplex Wire & Cable Co., Cambridge, Mass.).***

The service life of most rubber insulated underground cables has been excellent. There have been a few cases of failure in control and communications cables caused by direct contact with soil. Such failures are characterized by discrete spots of low insulation resistance. Under laboratory conditions favoring microbial activity we have produced in a few weeks failures resembling those found in cable after 10 or more years. Parallel tests in

active soil, sterilized soil, and water proved the failures were caused by microorganisms.

Insulation resistance is the most sensitive unambiguous criterion of failure of insulation in soil. It indicates microbial attack sooner than customary bacteriological methods. Insulations vary in resistance to microbial attack. GR-S and butyl compounds are stable in soils that cause rapid failure of natural rubber compounds. Other soils contain microorganisms that can attack them. Gutta-percha is more resistant than natural rubber. Neoprene, polyvinyl chloride, and polyethylene to date appear completely stable.

The probable mechanism of attack is oxidation by aerobic microorganisms. They appear to cause failure in three ways: by growing directly on the rubber and consuming it; by growing on soil particles in contact with it; and by growing near it. Enzymes seem to cause the failure. Deterioration occurs beyond regions reached by microbes. All three actions are involved in attack on natural rubber. Attack on GR-S and butyl is characterized by absence of surface colonies. Apparently the agents causing failure cannot utilize them directly as food. Conditions producing cable failure by microbial attack during reasonable service life are extremely rare.

10:55 A. M.—Effect of Traces of Antioxidant on the Stability of Crude GR-S. ***E. J. Glazer, C. R. Parks, J. O. Cole, and J. D. D'Ianni (Goodyear Tire & Rubber Co., Akron, Ohio).***

It has been frequently observed in this laboratory that different batches of crude GR-S, containing no deliberately added antioxidant, varied widely in stability. Some batches showed evidence of oxidation either at the end of the drying process or on aging for several weeks. In other cases, the stability of the polymer appeared to be comparable to regular GR-S containing antioxidant.

Since most of these batches had been prepared in regular plant or pilot plant equipment normally operated with GR-S containing antioxidant, it seemed probable that small amounts of antioxidant were being introduced into the polymer during manufacture. The observed differences in behavior of different batches would then be associated with varying amounts of antioxidant present in the finished polymer.

The object of the present work was to obtain information on the stability of antioxidant-free GR-S and to determine whether traces of antioxidant have any appreciable effect on stability of the polymer toward oxygen.

The stability of crude GR-S containing traces of antioxidant has been evaluated by measurement of oxygen absorption rates and changes in physical properties of the polymer during accelerated aging. Antioxidant-free GR-S was found to be highly unstable toward oxygen. The inhibiting effect of phenyl β-naphthylamine at a concentration as low as 0.001% could be detected, but the effect did not become appreciable until the antioxidant content reached 0.1%.

Tuesday Afternoon—November 9

2:00 P. M.—Compression-Set of Nitrile Rubbers as Affected by Compounding. ***C. G. Cashion (Xylos Rubber Co., Akron, Ohio).***

The advent of butadiene-acrylonitrile copolymers has led to the development of compounds to resist heat and oil or heat alone to a degree heretofore impossible. However, this new era of compounding has posed many new problems, one of which is the development of formulations that possess high resistance to compression set as well as resistance to various oils. The effects of nitrile content, pigmentation, curative systems, time and temperature of cure, processing safety of various curatives and effect of polymer dilution with other elastomers, i.e., crude, GR-S, and reclaimed hydrocarbon, have been studied, and the results are presented as a guide to the adoption of butadiene-acrylonitrile copolymers to new compounding developments.

In addition to the above, data on the effects of air, absence of air, and low vs. high aniline point oils on set at high temperatures are presented. A study of compression set at 212°F., 250°F., and 300°F. made in stocks of 40 ± 5, 50 ± 5, and 60 ± 5 durometer levels is also presented. Further studies relative to the effects of stock tempering following cure on compression set as a means of improving initial set properties have been investigated.

Future mechanical developments in the automotive and mechanical fields offer many possibilities for the use of acrylonitrile elastomers in applications that could not possibly be met with previously available materials.

2:25 P. M.—Infrared Studies of 1,2 and Trans-1,4 Structure of Polybutadiene and Budatiene-Styrene Copolymers Polymerized at Various Temperatures. ***E. J. Hart and A. W. Meyer (U. S. Rubber Co., Passaic, N. J.).***

Butadiene-styrene copolymers having superior physical properties are obtained by polymerization at temperatures of 41°F. or below. This improvement in physical properties is attributed to an increase in structural regularity of the polymer as the temperature of polymerization is lowered. In order to make a structural analysis of these polymers, a quantitative method is necessary for measuring either the cis or trans 1,4 content of the butadiene polymers.

1,2 and trans-1,4 addition of butadiene polymers were measured by employing infrared bands at 910 and 967 $cm.^{-1}$, respectively. 1-octene and trans 4-octene were used for calibration purposes. These methods were applied to structural investigations on polybutadiene polymerized in the temperature range —2° to +206°F. Butadiene-styrene copolymers prepared at 0°, 41°, and 122°F., were also studied.

Trans-1,4 addition increases and 1,2 addition decreases with decreasing temperature of polymerization in polybutadiene and butadiene-styrene copolymers. At —2°F. substantially all of the 1,4 addition product is present in the trans-1,4 form. Approximately 20 per cent 1,2 addition exists at this temperature. It is concluded that this accounts for the major part of the noncrystallizable portion of butadiene polymers made at low temperatures.

2:50 P. M.—The Structure of Neoprene. II. Determination of End-Groups by Means of Radiosulfur. ***W. E. Mochel and J. H. Peterson (E. I. du Pont de Nemours & Co., Wilmington, Del.).***

Sulfur-modified polychloroprene rubber, i.e., Neoprene Type GN, has been shown by the use of radioactive sulfur to be essentially a copolymer of chloroprene and sulfur in the approximate ratio of 100 chloroprene units per sulfur atom. The sulfur units, possibly disulfides, are cleaved by an alkaline emulsion of tetraethyl thiuram disulfide, so that a gel polymer containing combined sulfur can thus be converted to a soluble, plastic product. The mechanism of this cleavage reaction has not been completely elucidated as yet.

Potassium persulfate, used as initiator for the polymerization of neoprene, appears to be combined with the polymer in Neoprene Type GN in amounts equivalent to 8 to 17 polymer molecules formed for each sulfur-containing initiator fragment. However when dodecyl mercaptan is used as modifier, a large proportion of the polymer molecules contain essentially no combined sulfur from the persulfate and it appears that the true initiator is the RS• free radical formed by reaction of the mercaptan with potassium persulfate.

Dodecyl mercaptan, used as a polymerization modifier or chain transfer agent, is combined in a greater amount than the one mercaptan per polymer molecule expected on the basis of simple chain transfer. High molecular weight fractions contain 3 to 4 mercaptan sulfur atoms per polymer molecule and the results suggest that mercaptan addition to the double bonds of the polymer had occurred. The implications of these results are discussed.

3:20 P. M.—Dilatometric Measurement of Molecular Regularity in Polymers. ***V. E. Lucas, P. H. Johnson, L. B. Wakefield, and B. L. Johnson (Firestone Tire & Rubber Co., Akron, Ohio).***

The molecular regularity of various synthetic elastomers has been determined by measurement of the crystallizability of the raw, unstretched polymers. The relative crystallizability of the polymers was measured dilatometrically in terms of the isothermal volume decrease characteristic of the ordering process of crystallization by the use of Pyrex glass dilatometers of the type described by Bekkedahl and Wood in their study of the

crystallization of natural rubber [*Ind. Eng. Chem.*, vol. 33, p. 381 (1941)].

The crystallizability of a series of polymers, varying in composition from 100 per cent butadiene to 70-30 parts by weight of butadiene-styrene, which had been prepared in a ferricyanide-activated, diazo thio ether emulsion recipe at —10°C., was found to decrease regularly with increasing styrene concentration.

The molecular regularity of polybutadiene polymerized in the system described above and also in an oxidation-reduction (redox) recipe catalyzed by an iron pyrophosphate complex has been shown to be dependent on the polymerization temperature; the crystallizability of the polybutadiene increases markedly with decreasing polymerization temperature. A similar relation between polymerization temperature and molecular regularity has been found for a series of polychloroprenes polymerized in an emulsion system employing sodium rosinate, sulfur, and ammonium persulfate.

The stress-strain properties of gum compound vulcanizates of the polychloroprenes showed a striking improvement which coincided with increasing crystallizability of the polymers prepared at successively lower polymerization temperatures.

4:00 P. M.—An Instrument for Determining the Relaxation and Recovery of Elastomers. ***W. E. Phillips (B. F. Goodrich Co., Akron, Ohio) and B. G. Labbe (Government Laboratories, University of Akron, Akron, Ohio).***

An instrument has been developed which will determine the rate of relaxation of elastomers under compression or shear as well as recovery after partial or complete release of load at temperatures from —70°F. to 158°F. The load which is recorded on a Foxboro Dynalog is determined by means of a strain gage in a Baldwin SR-4 Type C force cell (capacity 2000 pounds).

The sample of elastomer to be tested is placed in the machine which is maintained at a constant temperature, and compressed to either a predetermined load or to a definite per cent by means of a hand crank. The sample may be tested with or without previous conditioning at the test temperature.

Although MacDonald and Ushakoff [*Anal. Chem.*, vol. 20, No. 8, p. 713 (1948)] report that the change in rate of relaxation is uniform with log time when elastomers are tested at room temperature, the rate of relaxation both at higher and lower temperatures is not similarly uniform. For this reason the continuous recording of the load and the use of a mechanism which permits the opening and closing of the specimen clamps by an indicated one-thousandth of an inch are of great value in the study of rate of crystallization or of stiffening at low temperatures.

A preliminary investigation has indicated that below 158°F. the amount of relaxation decreases with compounded GR-S, polybutadiene, natural rubber, GR-I and GR-M. A compound of Hycar OR-25 appeared to have fairly uniform relaxation properties over this temperature range.

Data obtained from the recovery of these specimens indicated inferiority of GR-M and Hycar OR-25 when tested at —70°F. The over-all picture shows GR-I to be slightly superior to the balance of the polymers as regards this characteristic.

Wednesday Morning—November 10

9:15 A. M.—A New Non-Discoloring Antioxidant for Natural Rubber. ***D. E. Winkler and F. M. McMillan (Shell Development Co., Emeryville, Calif.).***

It is shown that a representative of the trialkylphenol group is an excellent antioxidant for natural rubber compounds containing mineral fillers or carbon black. In high temperature aging conducted in air and in oxygen under pressure this phenol derivative has been found to compare favorably with the best commercial antioxidants. The retention of tensile strength and elongation and resistance to cut growth in the aged samples were excellent. The antioxidant is readily compatible with both natural and synthetic rubbers and has not been observed to bloom out at normal loadings of 1 to 3 PHR. It has little if any effect on the rate of cure of natural rubber and no allowance need be made for it in compounding. Distinct advantages in many applications are its light stability and nonstaining and nondiscoloring characteristics.

9:35 A. M.—Rubber and Vinyl Dispersed Colors and Their History. ***T. G. Sullivan (Sinclair & Valentine Co., New York, N. Y.).***

The real beginning of the use of organic colors in rubber goods came with the use of organic accelerators. The quality of colors in rubber has improved over the early pigments used. Colors were developed that possessed heat and light stability and nonbleeding characteristics; however, the particle size of the pigments has been the limiting factor in their use in rubber and vinyl stocks. The preparation of a color masterbatch by the wet method prevents the agglomeration of color particles during drying and insures a fine particle size and complete color dispersion. With the development of a protective colloid compatible with all natural and synthetic rubbers and many plastics, a new type of dispersed color has been made in this manner.

One of the largest fields for dispersed colors is the vinyl film industry where emphasis is placed on the final color particle size. Dry colors cannot be used as such but must be ground into plasticizers or dispersed while wet into a protective colloid that is compatible with the vinyl stock. The latter method yields a finer particle size and is more economical. With slight modifications it is possible to produce a powdered dispersed color which has far-reaching uses in vinyl film.

Theoretical explanations of the causes of the bleeding of colors in rubber and vinyl stocks are discussed. Methods of eliminating bleeding or crocking are covered. Proper compounding of rubber and vinyl stocks is important to prevent color discoloration, fading, and bleeding. It is necessary if quality colored goods are to be produced.

10:00 A. M.—Emulsifier-Free Latex. ***J. M. Willis (Firestone Tire & Rubber Co., Akron, Ohio).***

Many instances can be cited where it would be advantageous to have a latex without emulsifier or a polymer coagulated therefrom. This led to the development of a polymerization system wherein no emulsifier is charged to the reactor. Monomer, water, potassium persulfate (catalyst), and sodium metaphosphate (stabilizer) constitute the complete recipe. The ultimate latex contains derivatives of the polymer units such as sulfates, alcohols, glycols and sulfonic acids which lend stability. If a partially water soluble monomer such as acrylonitrile or methylmethacrylate is present, a reducing agent may be employed giving a redox type system and resulting in very rapid reaction rates.

Particle size studies on these latices with the electron microscope have shown a very large average particle diameter. A typical value is 5600 Angstroms compared to 800-900 for GR-S. It has been shown that the particle size increases as the reaction rate decreases. The fluidity of these latices is, of course, very good. These latices are normally acid but can be carried to a pH of above 7 by careful neutralization. Coagulated polymer from this system has shown outstanding resistance to aging.

10:20 A. M.—Factors Affecting Emulsion Stability in Blends of GR-S and Hevea Latices. I. The Stabilizing Power of Soap Solutions in Latex in the Presence of Inorganic Salts and Some Amino Acids. ***K. W. Gardiner (Firestone Tire & Rubber Co., Akron, Ohio).***

The ultimate stability of blends of soap-stabilized GR-S and Hevea latices will be dependent chiefly upon the degree of interaction occurring between the stabilizing media characteristic of each latex. In view of the complex molecular constitution of dilute soap solutions due to hydrolysis, the types of reactions that may take place can be quite varied. In addition to the changes in stability resulting from the formation of actual chemical complexes are those variations caused by the presence of certain electrolytes common to each system.

A fundamental study has been made of the emulsion stability behavior of a purified natural latex in which the proportions of several potentially reactive ingredients representative of each stabilizing system have been systematically varied. The observed changes in stability have been explained on the basis of salt effects and the possible association of one of the soap hydrolysates employed with certain amino acids. The actual enhancement of emulsion stability resulting from the association of a stoichiometric acid soap with the amino acids has been demonstrated.

10:45 A. M.—The Mechanical Stability Test for Hevea Latex. *H. G. Dawson (Firestone Tire & Rubber Co., Akron, Ohio).*

The mechanical stability test is a rapid, simple method of estimating the colloidal stability or quality of Hevea latex. It is shown that the latex particles start to agglomerate as soon as the peripheral speed of the agitator reaches the minimum value required to exert sufficient shear to overcome the force of repulsion due to the charge on the particles. If a sufficiently high, constant shear is applied, progressive flocculation continues during the test until mechanical coagulation occurs. The "end point" is defined as the time in seconds required to coagulate 0.5% to 1% of the total solids in the sample.

Tests indicated that most of the shear or rub on the latex takes place at the outer edge of the agitator. A flat disc is recommended as a standard in place of the Benedict ring type agitator formerly employed in similar apparatus. This shear depends upon peripheral speed which varies directly with shaft speed and the diameter of the agitator. Mechanical stability is shown to depend critically on the size of sample, the total solids, and the temperature. Lowering the temperature of the latex from room temperature to 10° or 5°C. increases the mechanical stability very markedly. Equipment and procedure for the test are described in detail.

Less significant factors are size and shape of sample bottle, ammonia concentration in sample, and atmosphere in which test is run. A high shear, low speed stability test was also studied.

11:05 A. M.—A Comparison of the Vulcanization Characteristics of 2-Thiazolethiol and Its Disulfide with Other Thiazole Accelerators. *A. J. Beber and R. A. Mathes (B. F. Goodrich Research Center, Brecksville, Ohio).*

For many years the mercaptothiazole class of accelerators has been the most widely used vulcanization accelerators in the rubber industry. Even though considerable interest has been evinced as to the efficacy of the simplest members of this series, the synthesis of 2-mercaptothiazole has only very recently been reported, first in a patent issued to the B. F. Goodrich Company in 1947, and subsequently in a paper by the authors together with the synthesis of its disulfide.

This compounding study was made to compare the vulcanization characteristics of 2-mercaptothiazole and 2,2'-dithiodithiazole with a number of commercial accelerators of the mercaptothiazole class. Equal concentrations by weight of the accelerators have been used in tread type stocks of natural rubber and GR-S.

The following tests were performed for comparison: tensile strength, modulus, elongation, Mooney cure, hysteresis, permanent set, aging, rebound, and hardness. This study shows that the behavior of 2-thiazolethiol is similar to other mercaptothiazole controls. The rate of cure is in the same general range but the scorch tendency, indicated by the Mooney cure, is greater. The values for hysteresis and permanent set are higher.

Stocks vulcanized with 2-thiazolethiol compare closely with the control accelerators in aging, rebound and hardness. In comparison with the dithiazyldisulfides employed as controls, 2,2'-dithiodithiazole follows in general the pattern outlined for 2-thiazolethiol. The activity of the disulfide is similar to the control accelerators but its delayed action effect is not as great. The hysteresis is higher in natural rubber but in GR-S the value falls between the controls.

11:25 A. M.—GR-S and Natural Rubber with Improved Processing Qualities. *Arnold R. Davis, Arthur C. Lindaw, and Ralph A. Naylor (American Cyanamid Co., Stamford, Conn.).*

During the past few years considerable improvement has been made in the processing characteristics and quality of GR-S. Some of the newer types of GR-S, and particularly the GR-S made at 41°F., still present problems in processing. Natural rubber continues to require plasticization in some way to facilitate the manufacture of many rubber products.

In a previous paper, one of the authors discussed, in considerable detail, the action, in dry GR-S and in dry natural rubber, of o,o'-dibenzamidodiphenyldisulfide or 2,2'-dithiobisbenzanilide now known as Pepton 22. The results of some experiments in adding Pepton 22 to GR-S latex and to natural rubber latex prior to coagulation are now presented. This catalytic plasticizer may be dispersed in water and added to GR-S latex and to natural rubber latex prior to coagulation and thereby obtain washed and dried polymers which can be readily plasticized by hot mastication.

Since most of the factory size masticating equipment gives only hot mastication, particularly with the new types of GR-S, only comparisons of hot mastication of the GR-S with and without Pepton 22 are shown.

GR-S-X-435 type (made at 41°F.) plasticized by Pepton 22 appears to require less accelerator than when no Pepton 22 is used with the same hot mastication. However, when properly cured the GR-S-X-435 containing the catalytic plasticizer gives evidence of improved cut growth resistance after aging.

Natural rubber may be prepared at the plantation with the desired amount of Pepton 22, shipped and stored with no evidence of softening until subjected to hot mastication.

Introduction of the **Type C Portable Elevator** marks the entrance of Montgomery & Co., Inc., New York 7, N. Y., into the materials handling field. The Type C is a light duty, hand operated production unit, having a capacity of 750 pounds.

The latest die-less duplicating unit developed by the O'Neil-Irwin Manufacturing Co., Lake City, Minn., is the **Di-Acro Shear No. 4,** a cutting unit with a maximum shearing width of 24 inches. The cutting range of the new unit extends from rubber and plastics to 16-gauge steel. It is said to be especially adaptable to model, research and experimental work.

A new **high-speed photo-electronic counter** which counts at rates up to 6,000 per minute has been developed by the Potter Instrument Co., Inc., Flushing, N. Y. Through the use of an electronic counter decade ahead of the electro-mechanical register, the counting speed of the unit is scaled down by a factor of 10, thereby increasing the reliability and accuracy of the unit.

A full-fledged, low cost electric fork truck, said to be equal in performance to any fork truck of similar capacity, has been added to the Transporter line featured by the Automatic Transportation Co., Chicago, Ill. Called the **Transrider Fork Truck,** it is a battery-operated unit with a capacity ranging from 2000 pounds with a 48-inch load to 3000 pounds with a 28-inch load. Despite an over-all height of only 83 inches, it can raise its load to 130 inches.

Porter-Cable Machine Co., Syracuse 8, N. Y., has introduced the **D-6 Portable Electric Disc Grinder,** said to be a powerful 5-in-1 portable tool which grinds, polishes, cuts, drills and buffs metal, wood, plastics, glass, etc. It weighs less than 6 pounds.

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Editorials . . . . . .

Government Decision

THE decision of the Reconstruction Finance Corporation to finance the installation of refrigeration equipment in government-owned plants to increase the production of low temperature synthetic rubber from the present 21,000 ton annual capacity to 183,000 ton capacity came as no surprise to the industry. Earlier claims, based on laboratory tests, that a 30 percent improvement in tire tread performance could be obtained with the new polymer, have since been borne out by road tests, the true criterion.

According to the RFC announcement, about half of the total synthetic rubber capacity now in operation will be equipped to produce low temperature rubber, with conversion to begin almost immediately. Low temperature polymers are now being produced at plants in Los Angeles, Baton Rouge, Naugatuck and Borger. The Borger plant, operated by U. S. Rubber, which is now producing about 3,000 tons of the polymer per year, will be among the first plants to receive the new equipment, and is expected to reach a 15,000 ton-a-year rate by the end of this year and reach a 30,000 ton-a-year rate sometime in 1949.

Although the statement issued by the RFC referred to low temperature rubber "polymerized at temperatures of 41 degrees and below" as being the "best tire tread material known," it is believed that the new installations planned will be devoted almost entirely to the production of 41 degree rubber. The basic reason for this is that at present the 41 degree polymer can be produced at approximately the same cost as standard GR-S. Production cost of both the 14 degree and 0 degree polymers is somewhat higher, although experimental lots of both polymers are being made available. The 41 degree polymer will be sold at the same 18½ cents a pound charged for standard GR-S.

Synthetic Nomenclature

LITTLE has been heard in recent months with regard to the possible adoption of a new name or general term for "synthetic rubber." Activity in this direction was quite hectic a year or two back, with at least two committees striving to select some appropriate term which would cover all of the man-made polymers. The rubber industry, unfortunately, has become somewhat lethargic in this instance, and seems content to let things drift along as they are.

What has brought this subject up again in these columns is the semi-official adoption of a new name in the language of textiles. The textile industry has long recognized the need to clear up both trade and consumer confusion which resulted from the use of the word rayon. Since its introduction this term has been applied to cover two entirely different fibers, i.e., regenerated cellulose and cellulose acetate. Recognizing the need to distinguish materials made from these different fibers, nomenclature action has been taken by the ASTM Committee on Textiles.

Under the definitions recommended by the ASTM committee, the word "rayon" is confined to man-made fibers composed of regenerated cellulose, such as those produced by the viscose process. For the cellulose ester fibers, such as cellulose acetate, the committee has proposed the adoption of the new generic name "estron." Many leading manufacturers of cellulose acetate textile fibers, including the Tennessee Eastman Corporation, are in agreement with this specific terminology, and will employ the term "estron" in labeling and advertising their products. It is safe to predict that within the next few years the term "estron" will be completely absorbed into the language of textiles. Certainly the rubber industry can do as well with its own problem.

Soviet Move

THE report that the Soviet Union has offered to purchase the entire natural rubber output of Ceylon has been confirmed in London. Since the Soviet Union has been an active purchaser of rubber in the Malayan market for the past year, it is obvious that it is seeking the rubber for stockpiling purposes. Such a move is entirely in keeping with today's political and economical maneuvering. However, it is indicative of how an unexpected move can serve to throw world estimates of production and consumption of rubber completely off balance. It is doubtful that the offer will culminate in a favorable agreement to the Soviet Union. If culminated, all figures on production and consumption for 1949 would have to be completely overhauled.

CURRENT NEWS OF THE MONTH

RFC TO EXPEND $3,500,000 FOR "COLD RUBBER" PRODUCTION

The Reconstruction Finance Corporation has announced a $3,500,000 program for an eight-fold increase in the production of low temperature synthetic rubbers. The expansion program entails the installation of refrigeration equipment in eight Government-owned synthetic rubber plants which will increase the nation's "cold rubber" output by approximately 800%. The material already is being produced in four plants at the rate of about 21,000 tons a year. When the expansion program is completed, production is expected to rise to 183,000 tons a year.

Tests showing that the new cold rubber gives 30% more mileage in tire treads is behind the decision to boost production of low temperature synthetic. RFC officials pointed out that this new type of synthetic rubber costs no more to produce than the regular synthetic product. Both types are presently sold to industry at 18½c a pound.

Officials of the Government agency stated that at least one of the larger tire companies is ready to advertise tires with "cold rubber" treads. About six pounds of rubber is required for the tread of most popular size passenger tires. An RFC technician explained that under the refrigeration processes it was possible to produce a product which approaches the molecular structure of natural rubber, and termed the new development "a revolution in rubber."

Early Installations Planned

The Government-owned rubber plants are managed by private rubber companies under a fee arrangement. The finished product is turned over to the RFC, which either sells it to industry or makes it available for the Government's stockpile of strategic materials.

The new equipment will go into plants operated by the U. S. Rubber Co. at Borger, Tex.; the Copolymer Corporation at Baton Rouge, La.; the Goodyear Tire & Rubber Co. at Los Angeles, Calif. and Houston, Tex.; the General Tire & Rubber Co. at Baytown, Tex.; the Firestone Tire & Rubber Co. at Lake Charles, La.; and the B. F. Goodrich Co. at Port Neches, Tex.

The Borger plant operated by U. S. Rubber will be an early receiver of the new equipment. Its production, now 3,000 tons of low temperature synthetic a year, is expected to get up to a 15,000 ton a year rate by the end of 1948. It is further expected to double that rate by early 1949.

The Baton Rouge plant of the Copolymer Corporation is to increase its cold rubber productive capacity from 15,000 to 30,000 tons a year, while the Los Angeles plant operated by Goodyear will turn out some 15,000 tons annually. The plant at Baytown, operated by General Tire, is to produce 30,000 tons a year, as is the Lake Charles plant operated by Firestone.

The Port Neches plant operated by Goodrich will produce 15,000 tons of the low temperature synthetic yearly. With the conversion being pushed at top speed, the RFC anticipates that half the synthetic rubber plant capacity now in operation will be converted to cold rubber production within a year.

Industrial Trucks

The rubber industry is using storage battery-powered industrial trucks far more widely this year than in 1944, according to a study recently completed by the Electric Industrial Truck Association. A report issued by the association indicates that there are 75% more users in 1948 than four years ago. The increase was attributed to growing awareness in the rubber field of the advantages of machine-size unit-load handling of material and products and to the versatility of this handling method, safety features, and low maintenance requirements of battery-powered trucks.

Buckmaster Remains URWA Head

L. S. Buckmaster was re-elected president of the United Rubber Workers of America (CIO) by the narrow margin of two votes at the 13th Annual Convention of the international rubber union, held at Omaha, Nebraska, from September 21 to 25. The vote was 810 to 808. H. R. Lloyd was re-elected vice-president by a four-vote margin. Charles E. Lanning, secretary-treasurer, was returned to office by a comfortable margin of 107 votes. The convention was the most turbulent held by the union to date, with President Buckmaster charging that "a ruthless political machine" was operating under cover in the union. His annual report, including charges that the Executive Board had refused to repudiate the Progressive Party and Henry Wallace's candidacy for president, was adopted by a vote of 818 to 788. One of the storm centers of the convention was N. H. Eagle, organizational director, whose replacement has long been sought by the Buckmaster faction. Some 90 amendments to the URWA constitution were proposed during the convention, action on many of them still pending.

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HIGH POLYMER FORUM FEATURES MIDWEST SESSION OF THE ACS

The High Polymer Forum, which has become a regular part of the meetings of the American Chemical Society, featured the Midwest session of the 114th meeting, held at St. Louis, Mo., from September 6 to 10. The Forum, under the chairmanship of Cheves Walling, of the U. S. Rubber Co., was held this time under the jurisdiction of the Division of Organic Chemistry. Highlites of the forum reported by *Chemical and Engineering News* follow:

A feature paper was that of J. L. Boland, and Geoffrey Gee, of the British Rubber Producers Association, on oxidative degradation of polyisoprene, delivered by Dr. Gee. Recent progress in the study of several problems related to oxidative degradation was discussed. It has been abundantly demonstrated, Dr. Gee stated, that under mild conditions of oxidation mono-olefins give high yields of unsaturated peroxides, with or without displacement of the double bond. It was recently shown that polyisoprenes behave in a more complex fashion, the first oxidation product normally containing four oxygen atoms, of which only two form part of a hydroperoxide group.

The formation of a mono-olefin hydroperoxide has been shown to involve a chain mechanism in which two chain carriers participate, Dr. Gee continued. Detailed studies of dihydrocymene and squalene have been made and it was reported that preliminary work suggests similar behavior for rubber and gutta percha. This oxidation is more complex than, but closely related to, that of mono-olefins, the chain propagation cycle involving four steps instead of two. It was suggested that in the second step the peroxide cyclizes by internal addition to the adjacent double bond.

Stating that while the bulk of polyisoprene undergoes oxidation by the mechanism described, Dr. Gee also discussed scission and cross-linking, which he considered of minor importance from the chemical standpoint.

Rate constants in free radical polymerization were dealt with by Max Matheson, Ellen Bevilacqua, E. E. Auer, and E. J. Hart, of the U. S. Rubber Co. Measurements of the life of the free radical by photochemical techniques were made. It was indicated that the lives are of the order of a few seconds and the concentration of active centers is of the order of 10^{-8} molar. It was concluded that in reactions of radical plus radical the frequency factors are nearly normal, while in reactions of radical plus olefin, the frequency factors are low, and that the rate constants are independent of radical size in the initial stage. These studies were made as a function of temperature in vinyl acetate, methyl methacrylate, and styrene.

PRESENTATION OF NEW MATERIALS FEATURES THIRD PLASTIC EXPOSITION

The introduction of several new plastics materials, as well as of new and improved machinery and equipment, featured the Third National Plastics Exposition, held from September 27 to October 1 at the Grand Central Palace in New York City. Although the 1948 exposition did not have as many exhibitors as did the first two shows, it attracted the largest attendance to date.

Several of its recently-developed materials were displayed by the Chemical Division of the Goodyear Tire & Rubber Co., including Tuf-lite, a high resin-low rubber blend material; Pliovic, a vinyl chloride copolymer which requires less plasticizer than many similar materials yet processes with greater ease; Pliolite S-7, a synthetic, thermoplastic, hydrocarbon copolymer especially engineered as a fine paper coating; Pliolite Latex 150 and 170, two new synthetic latices which have superior film forming characteristics to Pliolite Latex 190; and Pliolite S-4, especially developed for flexible base lacquers.

The attractive booth of the B. F. Goodrich Chemical Co. featured a number of the Geon materials, including the resins, Polyblend, plastic compounds, resin latices, plastic latices, Polyblend latex, and paste resins. Also featured were the recently-introduced Hycar EP and Hycar NS, nitrile rubbers which blend with vinyl materials. Properties of these two rubbers include permanent cementability, stability, non-migration, easy processing, high loading and wide latitude.

Two new basic types of Styron were announced by the Dow Chemical Co. at the exposition, these being Styron 637 and Styron 475. The latter material, while basically polystyrene, differs from that material in that its elongation at break is approximately 10 times that of regular polystyrene while its impact strength is three to five times greater. Styron 637 gives crystal and certain polystyrene colors greatly added light stability, increasing color permanence four to five times in certain applications. An interlocking plastic partition block for interior use, made of Styron, was introduced at the exposition by the Columbia Protektosite Co., of Carlstadt, N. J.

Bakelite Polyethylene Displayed

The wide and varied uses of the company's polyethylene was stressed in the exhibit of the Bakelite Corporation. Displays indicated the advantages of this material when used for sheathing on telephone cables and power and lighting wire, for packaging purposes, as insulation, etc. Applications of Vinylite, particularly for rainwear, were also emphasized. One of the novelties in the Bakelite exhibit was a new material consisting of Vinylite film reinforced and strengthened with a fiber backing. Uses for this new material include shelving, drawer linings and table covers.

Items ranging from air conditioning parts to toys which have converted, since the war, from other materials to plastics were featured in the exhibit of the Plastics Division of the Monsanto Chemical Co. Included among these items made from the various plastics materials featured by the company were refrigerator parts, bearings for small electric motors, egg beaters, light fixtures, scales, milking machine parts, and miscellaneous household items.

The adaptation of polythene film as a packaging material for frozen and fresh foods was a highlight of the DuPont exhibit. Recently developed uses for this film, other than for packaging, include raincoats, garment bags, bowl covers and table cloths. Among new developments for polythene stressed at the DuPont booth were bottle closures, wire insulation, flexible ice trays, pipe fittings, and hoses for refrigerants. Other materials exhibited by the company included Teflon, the tetrafluoroethylene resin; Plastacele, the cellulose acetate plastic; Butacite, the polyvinyl acetal resin, and nylon.

A wide variety of plastics materials were featured by the American Cyanamid Co., with emphasis on its molding materials, particularly Malmac plastic. Among new products displayed were Melmac Plastic 404, an extremely translucent material, designed primarily for fine shirt buttons, and Fast Cure Beetle Plastic, a new compound which makes it possible for compression molded parts to be produced much more rapidly than in the past.

Major attention in the booth maintained by the Chemical Division of Koppers Co., Inc., was given to P-8 Polystyrene, the new thermoplastic which will stand the heat of scalding water without distortion. This material has a specific gravity of 1.05 to 1.07, a tensile strength of from 8500 to 9500 lbs./sq. in., a Rockwell hardness of from 76 to 80, and a dielectric strength of 590 to 630 volts/mil.

Other manufacturers of plastics materials displaying their wares at the exposition included the Hercules Powder Co., which showed its comprehensive line of cellulosic materials; Durez Plastics & Chemicals, Inc., which displayed its various thermoplastic and thermosetting materials, including vinyl chloride-acetate compounds, and the Interchemical Corporation, which stressed its numerous finishing materials, including new flexible plastic coatings for fabrics, textiles and artificial leather.

Numerous molders, extruders and fabricators of plastics, showing end products of all kinds and descriptions, were of course among the exhibitors at the exposition. Among these were the Rubber Corporation of America, which featured its 100% virgin vinyl film sold under the trade-name of Rucoam, and the Industrial Synthetics Corporation, which displayed its flexible plastic material known as Elastron. Among other exhibitors was the Meyercord Co., displaying its V-Elasticals, a new kind of decalcomania especially developed for the decoration of vinyl products.

New Equipment Exhibited

Plastics molding presses of the compression, transfer and injection type, many of them improved models of older machines, were on display at the exposition. The new Tri-Dyne presses for thermosetting materials, which is said to feature fast uniform heating, thorough mixing, and accurate moisture control, were shown and demonstrated by the Defiance Machine Works. Preco, Inc., displayed its latest type of Preco bench-type hydraulic press. This is an electrically-heated press, with water-cooled platens, with controlled pressures up to 40,000 pounds.

The booth of the National Rubber Machinery Co. featured several models of the company's plastics extrusion machines which can handle heavy pipe for chemical use to fine monofilament for weaving into fabrics. A new type of Thermall electronic heater, especially developed for the rubber industry and which is said to cut curing time up to 50%, was displayed by W. T. LaRose & Associates, Inc., along with its regular line of plastic pre-heaters.

Several manufacturers of electronic seaming machines displayed their respective apparatus, including the Radio Receptor Co., Union Special Machine Co., and the Singer Sewing Machine Co. A new type of electronic sewing machine, featuring the continuous bonding of thermoplastic sheetings, was introduced at the exposition by Mayflower Electronic Devices, Inc., of West New York, N. J.

Of special interest to the rubber field, was the presentation of the Instron tensile testing apparatus by the Instron Engineering Corp., of Quincy, Mass. This new instrument is said to accurately measure and record load-elongation properties under tensile loading, hysteresis, and relaxation effects. It utilizes a precision electronic weighing system for detecting and recording the load applied to the sample under test. (EDITOR'S NOTE: A complete description of this new instrument appears on page 60 of this issue.)

Leeds Rubber Products Formed

Leeds Rubber Products, Inc., 4421 South La Salle St., Chicago 9, Ill., a newly formed Illinois corporation, has taken over the operating facilities of the American Industrial Rubber Co. of the same address. The American company will continue to function, but will confine its activities to sales. Leeds will continue to manufacture the same products as the American company, with some changes. The main line will be rubber floor tile and rubber floor mats. Officers of the new company are: *President,* Jack I. Leeds; *Vice President,* Paul Leeds; *Secretary,* Milton Leeds; *Treasurer,* Fred S. Leeds. Jack I. Leeds will be the only active member. He received his degree in chemical engineering at the Illinois Institute of Technology, and prior to the formation of the new company was superintendent of American Industrial Rubber. He has also been associated with Servicised Products, Inc., Frost Rubber Works, and Dryden Rubber.

Sun Chemical Builds Plant

Construction has been started on a new plant of the Warwick Chemical Division, Sun Chemical Co., in Wood River Junction, Rhode Island. The new plant will consolidate the facilities of the plant in West Warwick, R. I., and the present plant in Wood River Junction. Warwick Chemical manufactures textile chemicals, organic chemicals and waxes. It is expected that the new plant facilities will be in operation in the early part of 1949.

BRAKE LINING ASSOCIATION DISSOLVED BY COURT ORDER

The Brake Lining Manufacturers Association, Inc., was dissolved and with seventeen of its corporate members and nine officials of the concerns was fined a total of $152,000 through an order signed by Federal Judge Edward A. Conger in New York on September 22. This followed the defendants' pleas of nolo contendere to three indictments charging violation of the anti-trust laws.

The indictments, which were returned by a Federal grand jury in August, 1947, were dismissed earlier as to the Firestone Tire & Rubber Company and the Firestone Tire & Rubber Export Company and a number of other individuals.

The defendants were charged with entering three separate conspiracies to fix prices, discounts, classifications of customers and terms and conditions of sale on replacement brake linings and clutch facings.

With the fines ranging from $1,000 to $15,000, the heaviest levies, $15,000 each, were imposed on the association, the American Brake Shoe Company of Detroit, the Grizzly Manufacturing Company of Bell, Calif., Raybestos-Manhattan, Inc., of Passaic, N. J., and the Thermoid Company of Trenton, N. J.

Asserting that the case involved 96 per cent of the industry, Attorney General Tom Clark said that Judge Conger's judgment should benefit all owners of automobiles and trucks and the users of industrial equipment requiring brake linings and clutch facings. He also declared that the "high price" of brake lining materials should now be reduced.

Lester D. Stickles, attorney for the trade association, said that trial of the case would have involved calling hundreds of witnesses and presenting truckloads of evidence. He declared that the industry could not afford to spare top management for a long period at a time when it was trying to catch up with the country's production needs.

Asserting that the violations charged were based on procedures established at the insistence of the National Recovery Administration, Mr. Stickles said that these procedures had resulted in standardization of sizes and in other uniformities that had benefited the industry and brought substantial savings to the public.

For this reason, he added, the practices had been openly adopted and followed as accepted customs of the trade with no effort being made by members of the association to conceal them.

Aetna Sold For $350,000

Stockholders of the Aetna Rubber Co., Cleveland, Ohio, voted for sale of the company's assets for the sum of $350,000 on September 10. The sale was made to Ben Holub, Akron attorney, who was believed to be representing a group of investors. Philmore J. Haber, secretary and counsel for the firm, said holders of over 73,000 shares of common and preferred stock, out of a total of 87,000, approved the sale. The special meeting was held in the company's plant in Cleveland.

Coming Events

Oct. 18-22. National Safety Congress and Exposition, Chicago, Ill.
Oct. 19. Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.
Oct. 28. Northern California Rubber Group.
Nov. 8-10. Rubber Division, A.C.S., Fall Meeting, Book-Cadillac Hotel, Detroit, Mich.
Nov. 9. Washington Rubber Group.
Nov. 18. R. I. Rubber Club, Crown Hotel, Providence, R. I.
Nov. 18. Northern California Rubber Group.
Nov. 28-Dec. 3. American Society of Mechanical Engineers, Annual Meeting, Pennsylvania Hotel, New York, N. Y.
Dec. 7. Los Angeles Rubber Group. Xmas Party.
Dec. 9. Southern Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.
Dec. 10. New York Rubber Group, Xmas Party, New York, N. Y.
Dec. 10. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.
Dec. 14. Buffalo Rubber Group, Xmas Party, Westbrook Hotel, Buffalo, N. Y.
Dec. 17. Boston Rubber Group, Somerset Hotel, Boston.
Jan. 10-14. Third National Materials Handling Show, Convention Hall, Philadelphia, Penna.

Du Pont in Anti-Trust Action

In the first phase of a Government anti-trust investigation into the activities of E. I. du Pont de Nemours & Co., Inc., a federal judge issued an order on September 30 impounding records of eight companies involved in the case. The eight companies included the U. S. Rubber Co., General Motors Corp., Remington Arms Co., Ethyl Corp., North American Aviation, Inc., Bendix Aviation Corp., Kinetic Chemicals, Inc., and Christiana Securities, a DuPont holding company. It was indicated that the Government would investigate alleged monopolistic practices and the company's ownership of stock in other companies in an attempt to establish whether competition had been restricted through an interchange of products made by them.

August Rubber Consumption Rises

New rubber consumption in the United States totaled 92,236 tons in August compared with 83,280 tons in July and 86,290 tons in August, 1947, according to preliminary statistics of the Department of Commerce. Consumption of natural rubber in August was 53,028 tons, including 1,964 tons of latex. Synthetic rubber consumption totaled 39,208 tons, a figure exceeded this year only in January. The August synthetic total included 29,858 tons of GR-S, 5,739 tons of butyl, 2,921 tons of neoprene, and 690 tons of N-type. Climbing from the low of 19,291 tons registered in July, reclaim consumption amounted to 22,441 tons in August.

CITE HISTORY OF PENNSYLVANIA ON FIFTIETH YEAR IN BUSINESS

In keeping with the celebration of its fiftieth anniversary, the Pennsylvania Rubber Co., Jeannette, Penna., has released information on the early history of the company. Fifty years ago, the company's efforts were directed toward the production of rubber jar rings, solid rubber buggy and carriage tires, and rubber floor tile. Originally founded in Erie, Penna., by Herbert DuPuy at the close of the nineteenth century, Pennsylvania Rubber was moved to its present site at Penn-Craft Park, Jeannette, Penna., in July, 1901.

By 1910, the firm abandoned solid rubber tires for the manufacture of penumatic automobile and motorcycle tires and tubes. Following the advent of the pneumatic tire, Pennsylvania introduced its Vacuum Cup tire which featured the popular non-skid tread. With the coming of smoother roads and improved automobiles, the noises created by the cups superimposed on the treads was accentuated and "sound of safety" became an outmoded slogan. The old Vacuum Cup was succeeded by today's Silent Vacuum Cup tire which retains all the non-skid qualities of the original but none of the objectionable noises.

In 1910, the production of rubber jar rings was dropped, and the company undertook the production of tennis balls. Today, it is said to be the world's largest producer of tennis balls. The company does not manufacture any of the products it originally produced. Rather, complete lines of automobile, truck, tractor, and bicycle tires are manufactured as the company commemorates its fiftieth year.

The Pennsylvania athletic goods line has been expanded throughout the years to include footballs, softballs, volley and soccer as well as tennis balls. Toy balls designed for babies and children are also on the production list. Balloons, badminton shuttlecocks and golf balls also bears the company's trade name.

New Futures Contract Approved

A new rubber futures contract against which delivery of only one grade, No. 1 ribbed smoked sheets, will be permitted, was approved on the New York Commodity Exchange on September 15 by popular ballot of the membership. Trading in the new contract was to begin on October 11, with March, 1949, as the first delivery month. The previous rubber futures contract, trading in which is to be continued, calls for delivery of any of four different grades of natural rubber. The trading unit in both contracts is 10 long tons, or 22,400 pounds, with quotations in one-one hundredths of a cent per pound, or $2.24 per point per contract. A change in regular rubber futures commission, also voted on September 15, cuts the rate for non-members from $40 to $30 per contract for the round-turn, making the "day trade" rubber commission rate $15 per contract for the round-turn.

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SPERBERG AND POPP ADDRESS CHICAGO GROUP FALL MEETING

Approximately 140 members and guests attended the first fall meeting of the Chicago Rubber Group on September 24 at the Morrison Hotel, Chicago, Ill. L. R. Sperberg, of the Phillips Petroleum Co., addressed the group on "Low Temperature Rubber", while George Popp, also of the Phillips company, spoke on "Processing and Compounding Applications of HMP Black." The technical session was followed by a dinner hour and a program of entertainment which included the showing of a film entitled "Packsacks and Saddles" by Grant Halladay, naturalist and photographer.

In his address, Mr. Sperberg stated that the processing characteristics of Philprene A have been investigated and compared to natural rubber and to GR-S in Philback O and EPC black reinforced compounds. It has been found that Philprene A incorporates carbon pigments much faster than does either GR-S or natural rubber and at equal softener loadings Philprene A gives lower Mooney values than do the other two rubbers investigated. Mr. Sperberg noted that it also extrudes at a faster rate giving a smoother extruded specimen.

The speaker stated that the excellent physical properties of carbon black reinforced Philprene A compounds has led to the belief that mineral pigment reinforced Philprene A compounds would also be greatly superior to similarly loaded GR-S compounds. This has been found true for calcium carbonate, zinc oxide, talc, and hard clay reinforced compounds of 5.55, 16.65, and 27.75 volume loadings of pigments, he said.

In these variable loaded mineral pigment compounds, the substitution of Philprene A for GR-S has resulted in greatly increased tensile strength and elongation values, better aging characteristics, higher resilience, slightly better crack growth resistance, and improved processing characteristics, Mr. Sperberg said.

Although some of the Philprene A compounds reinforced with mineral pigments did not give sufficiently high tensile strengths to permit their exclusive use in certain industrial applications, the very excellent properties of Philprene A reinforced with from 10 to 30 phr of Philback O indicate that this combination is an excellent base to which mineral fillers can be added to formulate high quality, low cost compounds.

In his address, Mr. Popp discussed pertinent points relating to the processing and compounding of Philback A in natural rubber and in various synthetics. This discussion was presented as a practical resume of several important technical applications of HMF type black.

Such topics as thermal conductivity, electrical resistivity, and stress-strain characteristics were discussed. Among the stocks described were a 40 durometer neoprene molding compound, a GR-S compound for RS-415 specification, a 40 durometer GR-S molding compound, a GR-S compound for RS-500-515 specification, a GR-S compound for RS-915 specification, an automotive die run for RN-525 specification, and a GR-S sole compound.

Cradled in Rubber

The new Chief and Super-Chief models of the Keller Motors Corp., Huntsville, Alabama, are "cradled in rubber" and feature the "rubber ride." Utilizing the Goodrich Torsilastic spring, all four wheels of these new automobiles are independently suspended, the conventional steel springs being replaced with "trailing-arm" suspension units employing rubber permanently bonded to metal. The points of suspension below the wheel centers are reported to afford a maximum safety factor through an exceptionally low center of gravity. In addition, and for the first time, the differential as well as the motor is entirely insulated from the passenger through the use of rubber shock-mounts.

Chicago Plans Panel Discussion

The October 29 meeting of the Chicago Rubber Group at the Morrison Hotel, Chicago, Ill., will feature a panel discussion on the general subject of mechanical goods. Co-chairmen for this meeting are B. F. Benson (Inland Rubber) and A. G. Susie (Marbon Corp.). The following panel has been selected for the meeting: H. W. Rehfeld (Inland Rubber), tires; Paul F. Niessen (Victor Mfg.), gaskets; W. H. Lussie (R. T. Vanderbilt), rubber-metal adhesion; C. Yoran (Brown Rubber), sponge; Vail Hanley (Hanley Rubber), compounding; Leon J. D. Healy, compounding. A social hour and a dinner will precede the technical meeting which is scheduled for 7:30 P. M.

Philadelphia Holds Outing

Approximately 125 members and guests attended the annual outing of the Philadelphia Rubber Group, held at the Oak Terrace Country Club in Ambler, Penna., on September 17. Major attraction of the day was a golf tournament, with top prize awarded to George McNamara (Pequanoc Rubber) for hitting a ball closest to the pin on the 9th hole. A kicker's handicap was also held, with numerous prizes awarded following a drawing for winners. In addition to the golf prizes, some 90 prizes were also awarded to holders of lucky number tickets.

Ontario Hears Talk on Black

The October 5 meeting of the Ontario Rubber Section of the Chemical Institute of Canada, held at the University of Toronto, in Toronto, Ontario, was addressed by L. R. Sperberg of the Research Department of the Phillips Petroleum Co., Phillips, Tex. The subject of Mr. Sperberg's paper was "Carbon Blacks in Low Temperature Chemical Rubbers." The nature of Mr. Sperberg's talk was similar to an address he delivered on October 1 to the Detroit Rubber and Plastics Group, reported upon elsewhere in this issue.

DETROIT HEARS TALK ON BLACK IN LOW TEMPERATURE SYNTHETIC

A well-attended meeting of the Detroit Rubber and Plastics Group held on October 1 at the Hotel Detroit Leland, Detroit, Mich., heard L. R. Sperberg, of the Research Department of the Phillips Petroleum Co., Phillips, Tex., deliver an address on "Carbon Black Reinforcement of 41° F. Low Temperature Rubber." Mr. Sperberg's paper was prepared in conjunction with L. A. Bliss and C. C. Baird of the Phillips Co.

The speaker stated that the greatest advance in rubber technology during the past three years has been the development and adaptation to practice of low temperature rubber and the companion development of the high abrasion furnace type carbon black. In his report, Mr. Sperberg spoke of the various major classes of carbon black which have been investigated in 41° F. rubber (Philprene A) as compared to similar loaded black compounds prepared from GR-S and smoked sheet natural rubber.

The data show that Philprene A rubber possesses a high degree of reinforcement at low loadings of reinforcing blacks and at normal loadings of the fine thermal and semi-reinforcing types of black. Mixing studies show the low temperature rubber to incorporate carbon pigments more readily than either conventional GR-S or natural rubber. The HMF and HAF type blacks incorporate more readily than the channel types and give compounds that have superior processing characteristics.

Mr. Sperberg noted that road tests on these elastomer-carbon black compositions show that Philprene A reinforced with HAF black is substantially better in abrasion resistance than top quality natural rubber-channel black tread compounds while still maintaining excellent resistance to cut and crack growth.

Nomination Committee Appointed

The Southern Ohio Rubber Group, Dayton, Ohio, has announced the appointment of a nominating committee to select nominees for the 1949 slate of officers. The committee, which includes Walter R. Brown (Plastic & Rubber Products), Roger R. Hickernell (Inland Mfg.), LaVerne E. Cheney (Battelle Memorial Institute), Stewart L. Brams (Dayton Chemical), Frank Newton (Dayton Rubber), and Robert A. Emmett (Binney & Smith), will select nominees for chairman-elect, treasurer, secretary and four directors. Normally, only three directors would be selected at this time. However, one director, G. W. Yohe, is no longer connected with the rubber industry and has asked to be replaced. The nominating committee will submit one name each for each of the positions open.

A bronze "Oscar of Industry" has been presented to the Dayton Rubber Co. by *Financial World* for having the best 1947 annual report of the rubber and tire industry. Goodyear was runner-up in this classification and Seiberling Rubber took third place.

BOSTON GROUP HEARS REYNOLDS ON LOW TEMPERATURE POLYMERS

Approximately 300 members and guests attended the fall meeting of the Boston Rubber Group held on September 24, at the Somerset Hotel, in Boston, Mass. The main speaker of the evening was Dr. W. B. Reynolds of Phillips Petroleum Co., who spoke on "Low Temperature Polymers." A second speaker, Jimmy Kelley of the *Boston Herald-Traveller*, entertained the group with a talk on "An Inside Story of the 1948 Olympics." Mr. Kelley was assisted by his brother, Johnny Kelley, who spoke on marathon racing.

Dr. Reynolds' address was similar to the one he delivered before the Philadelphia Rubber Group on June 11, which was reported upon in the July issue of RUBBER AGE. At that time, Dr. Reynolds stated that experiments at Phillips' laboratories have indicated that Philprene A (41° F.) is rated from 20 to 40 per cent superior to GR-S while Philprene B (14° F.) is superior even to Philprene A. When compounded with HAF black (Philblack 0) these new chemical rubbers are substantially superior to natural rubber for tire treads.

The low temperature polymers are believed to differ appreciably in structure from GR-S, which is manufactured at 122° F. They are known to possess a substantially higher number average molecular weight and to contain much less very low molecular weight or "soupy" polymer. However, more importantly, X-ray studies indicate that the low temperature polymers are more linear in character with less branching and cross-linking. This is believed to contribute importantly to their better flex life and abrasion resistance.

Russia Seeking Ceylon Rubber

According to reports from Colombo, the Soviet Union has made an offer to purchase the entire rubber output of Ceylon at prices higher than those currently quoted. Ceylon's normal annual output runs to approximately 80,000 tons. At present, the Soviet Union secures some Ceylon rubber through British and American channels. It was pointed out in London that Ceylon is now a dominion of the British Empire and as such is not required to consult London regarding its foreign trade and is free to make any deals it desires. The Soviet Union has been buying huge quantities of natural rubber, presumably for stockpiling purposes, her Malayan purchases in the first eight months of the year amounting to some 60,000 tons.

Offer Mill Maintenance Card

A new operation and maintenance card covering its Double Runner Attrition Mill has been issued by Sprout, Waldron & Co., Muncy, Penna. Many of the marginal subjects covered by the new card will prove of special interest to general users of attrition mills inasmuch as maintenance information has been rather inadequate heretofore. Copies of the card can be secured without cost on direct request from the company.

Rubber Pads Cushion Subway

Products of the B. F. Goodrich Co., 40,000 rubber pads will be used to cushion the rides of passengers on the new Dearborn Street subway in Chicago, Ill. The deep-

dimpled three-quarter inch pads, illustrated herewith, resemble egg crate partitions, and are designed to go between rails and tie plates to cut down noise and vibration. Goodrich engineers claim that the pads have a life expectancy of fifty years.

Bayshore Industries Buys Tract

Bayshore Industries, Inc., manufacturers of rubber toys in Elkton, Md., has purchased a 42-acre tract of land known as Singerly Village near Elkton. The War Assets Administration said that the company had bid $20,579.26 for the property, which was formerly a housing project for women war workers. There are two large frame buildings presently on the ground. The company said it would double the number of its employees, now 300, within five years if the conditions of sale are approved by the WAA.

Producing Vinyl Chloride Resins

Monsanto Chemical Co. has begun the commercial production of vinyl chloride plastic resins. Company officials stated that present facilities for manufacturing resins will be followed shortly with calenders to produce both thin and heavy gauge film. Both the resins and the film will be sold under the trade name "Ultron." The production of vinyl chloride plastics places Monsanto in a position to supply a complete line of plastics for all major uses, officials added.

Cow Official Visiting U. S.

Gilbert MacIntosh, purchasing agent for the P. B. Cow group of companies, is currently on an extended visit of the United States and Canada. P. B. Cow & Co., Ltd., with headquarters in London, England, is one of the larger rubber manufacturers in that country. During his visit Mr. MacIntosh can be reached at Britam Agencies, Inc., 245 Fifth Ave., New York 16, N. Y.

SOUTHERN OHIO HEARS TAFT ON SYNTHETIC RUBBER DEVELOPMENTS

The Fall Technical Meeting of the Southern Ohio Rubber Group was held at the Engineer's Club of Dayton, in Dayton, Ohio, on September 16. Principal speaker of the evening was W. K. Taft, manager of the pilot plant at the Government Laboratories, Akron, Ohio. Mr. Taft spoke on "Some Recent Developments in Synthetic Rubber."

The speaker explained the work his organization was doing on the new low temperature polymers and gave numerous statistics showing physical properties and the results of road tests. Following Mr. Taft's address, a sound motion picture entitled "Inside the Flame" was shown through the courtesy of Godfrey L. Cabot, Inc.

At a brief business session preceding the technical meeting, approximately one hundred members and guests heard Robert L. Radow, chairman of the group, announce that the group had been voted sponsorship by the Division of Rubber Chemistry, A.C.S. Dr. Bernard Adinoff (Dayton Rubber), was chairman of the meeting.

Plasticizer DP-77

E. F. Drew & Co., Inc., 15 East 26th St., New York 10, N. Y., has announced the development of Plasticizer DP-77, designed to meet the needs of industry requiring a moderate cost, high efficiency plasticizer. Its blooming characteristics are said to be very good when compared with other fatty acid esters such as sebacates, caprylates and riccinoleates. The company recommends that the plasticizer be used in amounts of from 10 to 30% of the total plasticizer composition. In this way, it is claimed that full advantage will be gained of its low heat loss efficiency, excellent low temperature characteristics and good plasticizing action.

Rumanian Rubber Production

According to the U. S. Department of Commerce, Rumanian production of rubber articles under the jurisdiction of the Industrial Office for Rubber has been increased during the past six months, from a monthly average of 115 metric tons to 281 tons. The figures were originally revealed in the Rumanian press. The estimated total annual output of Rumanian rubber manufacturers is 3,000 metric tons valued at $13,333,000. Production of tires and tubes is estimated at 120 metric tons per month, but details regarding types and sizes are not available. Russia is said to have supplied 650 metric tons of synthetic rubber during 1947, and is obligated to supply the same quantity in 1948.

Tire Firms Accused by F.T.C.

The Federal Trade Commission has accused the Cooper Tire and Rubber Co., and the Cooper Corporation, both of Findlay, Ohio, of failing to mark second-grade tires properly, thus making it easy for "unscrupulous dealers" to fool the public. The former company manufactures the tires while the latter sells the tires to dealers.

ADDITIONAL PUBLICATIONS OF THE BRITISH RUBBER RESEARCH GROUP

The British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England, has issued a number of new publications since those reported on in our May, 1948, issue. Many of these booklets are reprints of articles appearing in various British technical journals and reflect the research work conducted by various members of the B.R.P.R.A. staff. Copies of the booklets can be secured without cost from the Association. Abstracts of the more recent publications follow:

Some Thermodynamic Properties of High Polymers, and Their Molecular Interpretation. By Geoffrey Gee. (Publication No. 86): This paper contains a review of a number of thermodynamical properties of high polymers, in which the emphasis is laid throughout on recent qualitative or quantitative work relating these properties to the molecular structure of the polymer. The treatment is general, but most of the examples quoted refer to natural rubber. It is impossible to treat such topics in a completely non-mathematical manner, but the argument throughout is developed in terms of simple physical concepts. The subjects dealt with are: (1) equilibrium in polymer systems, (2) crystallization, (3) second order transitions and brittle temperatures, (4) high elasticity, (5) absorption of gases and vapors by polymers, (6) solubility and swelling of polymers in liquids. Some new work is reported in sections (2) and (5).

Kinetic Studies in the Chemistry of Rubber and Related Materials. Part IV. The Inhibitory Effect of Hydroquinone on the Thermal Oxidation of Ethyl Linoleate. By J. L. Bolland and P. Ten Have. (Publication No. 87): The determination of the mechanism by which antioxidants afford protection to rubber compounds normally used technologically presents experimental problems much too complex for solution at the present moment. In the case of certain simple oxidation systems it is, however, possible to identify the precise role which antioxidants play.

In this paper the selected oxidation system is one which has already been investigated in detail—the autoxidation of ethyl linoleate—while the antioxidant is hydroquinone. Kinetic examination shows that here the inhibiting effect of the hydroquinone arises from the efficiency with which it removes peroxido radicals from the system: since these radicals are necessary for the propagation of oxidation chains, the chain length and therefore the rate are greatly diminished (a ten-fold diminution in oxidation rate is achieved by addition of ca. 10^{-3} molar % hydroquinone).

It is demonstrated that one molecule of hydroquinone is converted to a wealdy-inhibiting product (presumably benzo quinone) for every two interactions between hydroquinone molecules and peroxido radicals.

Statistical Treatment of Polymer Solutions at Infinite Dilution. By W. J. C. Orr. (Publication No. 88): The least satisfactory feature of the current statistical theories of polymer solutions is their treatment of dilute solutions. At sufficiently high dilution the molecules are substantially independent of one another. Depending on its flexibility and heat of solution each molecule will be more or less kinked up into a loose ball, with liquid between the folds. Each such ball is rather like a droplet of concentrated solution; the surrounding liquid contains no polymer. This paper contains a first attempt to estimate the number of points at which a flexible molecule curls back into contact with itself, and discusses how this depends on the heat of mixing. The results are in rough agreement with deductions from experimental work on solutions of rubber in benzene.

The Photo-Elastic Properties of Rubber. Part I. The Theory of the Optical Properties of Strained Rubber. Part II. Double Refraction and Crystallization in Stretched Vulcanized Rubber. By L. R. G. Treloar. (Publication No. 89): The study of double refraction provides an alternative approach to the problem of estimating the development of crystallization in stretched rubber, which though of less absolute accuracy than the X-ray method, is frequently useful on account of the rapidity and simplicity of the technique. In this publication the theoretical laws of photoelasticity, i.e., of the relation between the double refraction and the applied stress, are worked out for a homogeneous strain of the most general kind. Experiments on vulcanized rubber show general conformity with the theoretical laws up to about 300 per cent elongation; thereafter the phenomena or crystallization lead to enhanced double refraction. Experiments at temperatures ranging from —50° to +100°C show a maximum development of crystallization at about —25°C. These observations have an important bearing on the question of the tensile strength of rubbers.

Syntheses in the Thiopyran Series. Part I. Tetrahydro-Derivatives. By Ralph F. Naylor. (Publication No. 90): In the reaction of either sulfur or hydrogen sulfide with the polyisoprenic compounds, geraniolene and dihydromyrcene, there arise considerable proportions of cyclic sulfides of the thiopyran series. To establish the structure of these compounds it was necessary to effect their synthesis, and this paper presents the synthesis of 2:2:6:6-tetramethyltetrahydrothiopyran and 2:2:6-trimethyl-6-ethyltetrahydrothiopyran, which are shown in a subsequent paper to be the same as the products of reaction of hydrogen sulfide with geraniolene and dihydromyrcene respectively.

Tensile Strengths of Pure Gum Natural Rubber Compounds. By Geoffrey Gee. (Publication No. 91): The tensile properties of a range of pure gum natural rubbers are reviewed, and it is shown that their principal features can be understood on the assumption that the tensile strength measured in a given test depends directly on the amount of crystallization at break.

The most important single factor in determining tensile strength is the degree of cross linking. Cross linking is only needed in order to prevent plastic flow, thus permitting the molecules to be aligned by stretching, and hence to crystallize. A very highly cross-linked rubber is weak because the load required to stretch it is so high, that the rubber is broken before the elongation becomes large enough to produce crystallization.

In general, vulcanization also involves reactions, e.g., the combination of sulfur with the rubber, which inhibit crystallization by producing structural modifications of the rubber. These reduce the tensile strength, especially when the degree of cross linking is large.

These ideas readily explain the effects of swelling and of the temperature of test. They are also used in a brief discussion of the phenomena of overcure, reversion, and aging.

Large Elastic Deformations of Isotropic Materials. Part I. Fundamental Concepts. Part II. Some Uniqueness Theorems for Pure, Homogeneous Deformation. By R. S. Rivlin. (Publication No. 92): These papers are the first two of a series dealing with the theory of large elastic deformations. The ultimate object is to place the design of rubber components for engineering purposes on a sound scientific basis, which requires the development of a fundamentally new approach to the mathematical theory of elasticity, hitherto restricted to small deformations such as are encountered in metal engineering.

In part I the general equations governing the relations between the stresses and strains in an inhomogeneously strained body are developed. By means of these equations it is possible in principle to solve any problem involving large elastic deformations.

In part II the problem of a body acted on by a simple set of stresses is examined in detail. It is shown that under certain conditions the state of strain is uniquely determined, while under other conditions several alternative states of strain may be found to satisfy the equations.

Goodyear to Build Navy Airship

The U. S. Navy Bureau of Aeronautics has awarded a contract to the Goodyear Aircraft Corporation for the engineering design of a type "N" non-rigid airship. Largest non-rigid lighter-than-air craft ever contracted for by the Navy, the "N" ship will have a helium capacity of 825,000 cubic feet. Of a new and radical design, the engines of the airship will be enclosed within the car. The enevlope itself will be three-ply fortisan-rayon fabric coated with neoprene. Designed primarily for patrol operations, the new blimp will have an empty weight of approximately 34,000 pounds. It will be 324 feet long, 71 feet wide, and 92 feet high.

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RUBBER INDUSTRY IN CHINA ATTAINING NEW HIGH LEVELS

According to reports reaching this country from Shanghai, the rubber goods industry, introduced into China only a few years ago, has become the third largest light industry in the country, coming after cotton and flour. The growth of the industry to its present position has been all the more remarkable since the country produces almost no raw materials, and the industry depends on foreign supplies.

The rubber industry, at the moment, is most developed in Shanghai. The first Shanghai plant, known as the Model Factory, was constructed at Kiangwan in October, 1921. The venture did not prove a success, due to the lack of experience on the part of the operators and the strong competition of foreign rubber goods.

The initial failure did not deter attempts to develop the industry, and several factories were soon established. It was not until after 1928, however, that Shanghai manufacturers of rubber products met with some success. The growing popularity of rubber goods, especially shoes, the revisions of the Custom's tariff, and the slump in raw rubber prices at that time helped to foster the growth of the new industry. By the time the Sino-Japanese war broke out in 1937, there were 59 rubber manufacturers in Shanghai.

War Damages Industry

In common with other industries, the rubber industry suffered considerable damage during the war. Some factories managed to move their equipment into foreign settlements, but business became increasingly difficult. The outbreak of the Pacific war brought with it complete Japanese domination as well as the loss of new supplies of raw materials. The industry was practically stagnant.

After V-J Day there was a rush to reestablish the rubber industry in Shanghai. Many of the old plants were gradually restored, and many new plants came into being. According to current statistics, there are now 84 factories employing over 15,000 persons in Shanghai. There are presently 384 mixers in operation in Shanghai. An additional number of 66 mixers was reportedly being installed by various factories in an attempt to extend operations.

The existing 384 mixers are distributed among the 84 factories in a very uneven proportion, ranging from only one machine in many of the smaller establishments to dozens owned in the large factories. The Great China Rubber Works, which operates four factories, for example, has 66 mixers, the Nee Sheng Rubber Factory 16, the Cheng Tai Rubber Factory 29, and the Hung Ta 16.

Some Production Figures

While rubber shoes, tires and tubes, and toys are the first and still the chief products, the industry also manufactures important industrial equipment such as V-belts, rubber belts, hose and other appliances. Figures for the production of the more important items of the industry for the month of March, 1948, include the following:

Canvas shoes, 4,022,043 pairs; rubber soles, 112,015 pounds; overshoes, 871,378 pairs; heels, 17,426 dozen; tires for rickshaws, bicycles, etc., 54,915 sets; inner tubes, 83,742 sets; tires and tubes for motor cars, 4,800 sets; rubber boots, 10,400 pairs; rubber belting, 4,296,931 inch-plies; ebonite, 10,986 pounds; hot water bags, 2,185 dozen; rubber rollers, 1,523; V-belts, 6,000 feet. Other items in the extensive list of manufactured rubber goods include such products as sponge, rubber bands, pumps, erasers, gloves, toys, balls and bladders, tubing, rubber thread, thin rubber sheeting, and other minor categories of goods.

In spite of the progress which is being made, the industry is still dependent on outside sources for chemicals. Most chemicals have to be imported and foreign trade restrictions and quota systems have made supplies inadequate. A number of items are now produced in the country in increasing quantities to make self-sufficiency a not too distant possibility.

Zinc oxide, calcium carbonate, and stearic acid are some requisites of the industry which are being produced locally. Carbon black, lithopone, sodium silicofluoride, sulfur, and different antioxidants must still be imported.

Rubber Manufacturers' Guild

All imports, including raw rubber and chemicals, are now handled by the Rubber Manufacturers' Guild and allotments are made by the Guild to its member factories according to their size. Even this method is inadequate, however, and manufacturers must resort to dealings with various merchants in the city, some of whom have old stocks on hand.

At present, the Chinese rubber industry does not seem to have a problem in the marketing of its products. In the case of shoes and boots of all kinds, the principal item of production, running to an aggregate of 5,000,000 pairs a month, the Army consumes about 50%, while the remainder find a ready market in up-country districts.

The production of V-belts is barely sufficient to meet industrial needs. Tires and tubes for rickshaws, pedicabs and bicycles are produced in approximately adequate quantities to meet demands. The production of motor car tires and tubes, while growing, is still not sufficient to meet demand. The importation of these items causes a considerable drain on the country's foreign exchange resources.

Rainwear Survey

According to a survey recently completed by the U. S. Department of Agriculture, only 28% of the female population in the United States buy rainwear. Of that number, only 1% prefer rubber rainwear, other preferences being as follows: cotton, 29%; rayon, 15%; plastic, 8%; wool, 5%; shiny material, 5%; rayon-cotton blends, 4%. The cotton rainwear leading in preference is of the type generally treated with water-repellent chemicals.

RUBBER IMPORTS INTO GERMANY SET AT 67,000 TONS FOR YEAR

Imports of rubber into Western Germany during the year ending June 30, 1949, now are planned to include 60,000 tons of natural rubber and 7,000 tons of synthetic rubber, according to reports from the American Conusulate at Frankfort, the Rubber Division, Office of Domestic Commerce, said recently.

Originally, German imports of natural rubber for the calendar year 1948 were scheduled at 34,800 tons, but actual contracts in the first six months called for 28,050 tons, the greater part of which was delivered during that period. Natural rubber imports for the last six months of 1948 now are scheduled at 17,210 tons per quarter.

The import program is dependent on financing by the Economic Cooperation Administration and other American sources, since exchange would not be available otherwise. Some cycle tires and general rubber goods, but no automobile tires, are exported from Germany, and German foreign trade as a whole shows a large import balance.

Automobile tire requirements in Western Germany for 1948 originally were estimated at 2,500,000 units. This has been reduced to 2,304,000, or 192,000 a month. Domestic production, which was expected to average 123,000 a month, reached an average of 131,000 monthly in the second quarter. In July, 186,000 tires were turned out. Germany thus is becoming rapidly self-sufficient in tires, and imports will be much lower than the $7,000,000 worth originally planned for the current calendar year.

German production of synthetic rubber ceased July 1, in accordance with the Potsdam Agreement, and the 7,000 tons to be imported are expected to come from the United States.

According to another report issued by the Department of Commerce, production of automobile and truck tires in the Bizonal Area of Germany in the first 3 months of 1948 totaled 348,000 units, as compared with only 130,000 units during the corresponding period of last year. Production of automobile and truck tires during the full year 1947 totaled 906,000 units, an increase of 54,000 over the 1946 output of 852,000. Production in neither year, however, approached the 1936 oqutput of 2,724,000 tires.

The output of bicycle tires in the first 2 months of 1948 reached 867,000 units, compared with 232,000 units in the first 2 months of 1947. In the first quarter of 1947 the output of bicycle tires totaled 542,000 units. Production of bicycle tires totaled 3,876,000 in 1947, compared with 3,960,000 in 1946. The output in 1936 was 29,448,000 tires.

Erie Foundry Elects Officers

At the annual stockholders and directors meeting held recently, the following officers were elected to head the Erie Foundry Co., Erie, Penna.: *President and Treasurer,* D. A. Currie; *Honorary Vice-President,* F. F. Clark; *First Vice-President,* James A. Currie; *Second Vice-President,* Robert N. Yates; *Secretary,* C. D. Pinney.

NAMES IN THE NEWS

JOHN J. FREEMAN, previously associated with the Foster Wheeler Corporation, New York City, has been appointed technical director of the Neville Co., Pittsburgh, Penna.

J. A. FOUCHE, formerly assistant manager of the Diversified Products Sales Department of the Seiberling Rubber Co., has been appointed manager of the department succeeding PAUL B. MEANS who has resigned to head a manufacturer's agency in Atlanta, Ga.

S. R. ZIMMERMAN, JR., has been appointed director of friction material research and development of Raybestos-Manhattan, Inc., with headquarters at the United States Asbestos Division, Manheim, Penna.

DR. EUGENE G. HAAS, former director of chemical research for the B. F. Goodrich Co., Akron, Ohio, has been named head of the newly-created chemistry department of Fenn College, Cleveland, Ohio.

HERSHEL A. JEFFRIES, formerly associated with the Pharis Tire & Rubber Co., and for sixteen years assistant city engineer of the city of Newark, Ohio, has joined the Dayton Rubber Co. as senior designing engineer.

GEORGE W. MESSNER, employed at the Akron, Ohio, plant of the American Hard Rubber Co. as a master mechanic, retired on September 26, after thirty-two years of service with the company.

J. P. CONNORS, formerly associated with the Goodyear Tire & Rubber Co. as section head in the materials contact division of inter-plant relations, has been named purchasing agent of the company plant in Buenos Aires, Argentina.

CARL J. LAMB, previously associated with the Westinghouse Electric Corp., Sharples Chemicals Inc., and Hydropress, Inc., in engineering capacities, has been appointed consulting engineer of the Hydraulic Press Manufacturing Co., Mount Gilead, Ohio.

ROBERT M. HONEGGER, general manager of the Buffalo, N. Y., plant of Farrel-Birmingham Co., Inc., was elected a member of the board of directors of the company on September 24.

DR. FRANK B. POPE, formerly associated with the B. F. Goodrich Co., has joined the Sales Department of Sharples Chemicals Inc. He will be a member of the Chicago sales office.

FREDERICK SAGE, formerly with the Mimicry Co. of Detroit, Mich., is now associated with the technical service group of the Los Angeles plant of the U. S. Rubber Co.

LANSING T. CARPENTER, previously general assistant director of public relations for the U. S. Rubber Co., has been appointed director of advertising and public relations for the Russell Manufacturing Co., Middletown, Conn.

DR. J. H. BACHMAN, associated with the Columbia Chemical Division of the Pittsburgh Plate Glass Co., has been elected chairman of the Akron section of the American Chemical Society.

MAURICE O. BARR, formerly technical representative of the Pigment Division of the Eagle-Picher Co., has been appointed technical representative for the Associated Lead and Zinc Co. of Seattle, Wash., the corporation recently formed by Eagle-Picher and the Northwest Lead Co. of Seattle.

LEONARD P. GRAHAM, previously associated with the Windram Manufacturing Co., has joined Chase & Sons, Inc., Randolph, Mass., as technical director.

G. F. ROQUEMORE, associated with the Cooper Tire & Rubber Co. for the past several years, has left that organization and is now with the Caram Chemical Co., Grove City, Ohio, as technical manager.

G. M. WRIGHT, a member of the Development Department of the Goodyear Tire & Rubber Co., has been appointed production representative of the company in Sahaganj, India, succeeding W. L. CAMPBELL, who has returned to Akron for reassignment.

Faultless Elects Officers

The stockholders of the Faultless Rubber Co., Ashland, Ohio, at their annual meeting held on September 24, re-elected all present directors of the company. At the organization meeting of the board of directors held immediately following the shareholder's meeting, the following officers were elected: *President,* Wallace De Laney; *First Vice-President,* T. W. Miller, Jr.; *Secretary and Treasurer,* George A. Meiler; *Assistant Treasurer,* Z. T. Wile; *Assistant Secretary,* R. C. Johnson.

Enjay Raises Perbunan Prices

Effective October 1, prices on all grades of Perbunan, synthetic rubber distributed by Enjay Co., Inc., 15 West 51st St., New York 19, N. Y., were raised due to increased costs of raw materials, manufacturing, and transportation, company officials recently announced. Prices for Perbunan 18, 26NS60, 26NS90 and 35NS90, now range from 0.430 cents to 0.530 cents depending upon quantity and delivery points. Company officials pointed out that this price rise was the first in nearly two years.

Consumption For Year Declines

Estimated rubber consumption for the first eight months of 1948 totaled 723,065 long tons, the Rubber Manufacturers Association reported recently. This compares with 736,270 long tons in the same period last year or a reduction of 1.79%. For the year to date, natural rubber consumption totaled 423,758 tons against 346,458 last year and total synthetic consumption amounted to 299,307 long tons compared with 389,812 long tons for the previous year. August consumption was estimated by the Association at 92,106 long tons, an increase of 10.5% over July when 83,286 tons were reported. As July was subject to interruptions in production on account of vacation and maintenance, August consumption is more in line with June when 94,905 long tons ware consumed. Natural rubber consumed in August was estimated at 53,014 tons, an increase of 8.69% over July when 48,775 tons were consumed. Total synthetic rubber consumption was set at 39,092 tons, up 13.27% over July consumption of 34,511 tons. Reclaimed rubber consumption was estimated at 23,367 tons in August compared with 19,367 tons in July.

Forms Chemical Products Firm

Formation of a wholly-owned subsidiary to handle chemical products was recently announced by the Standard Oil Co. of Indiana, Chicago, Ill. The new subsidiary will be known as the Indoil Chemical Co., with headquarters in Chicago. The present sales and other activities of the parent company's chemical products department will be taken over by the new company as soon as possible. Officers of the new corporation include W. B. Plummer as president and Dr. R. C. Gunness as vice-president. H. R. Peterson, formerly sales manager of Standard's chemical products department, has become sales manager of the subsidiary. Mr. Plummer was formerly manager of the department. Dr. Gunness will continue as manager of research for Standard while serving as an officer of Indoil.

Dealer Group Sues Manufacturers

The National Association of Independent Tire Dealers, and twenty-six of its members, filed suit in Federal Court at Washington, D.C., on October 1 against the Rubber Manufacturers Association and six of the larger tire manufacturers charging conspiracy to fix tire prices. Damages in the amount of $4,266,000 were requested. The suit was brought along the same lines as the criminal action filed by the Department of Justice last year which alleged violation of the anti-trust laws. This suit is still pending. Tire manufacturers named in the current action include U. S. Rubber, Goodyear, Goodrich, Firestone, General Tire and Lee Rubber.

An Index to Volume 63 of RUBBER AGE will be found on Pages 119 to 122 of this issue.

Goodyear Textile Special V-Belt

The Mechanical Goods Division of the Goodyear Tire & Rubber Co. has announced production of a special textile V-belt for individual motor drives on spinning frames and similar equipment. Known as the Goodyear Textile Special, the belt is being made in sizes to fit standard "B" section V-belt sheaves. Company officials stated that the belt is designed especially to withstand the severe overloads resulting from high starting torque to which frame drives are subjected. Tension members, the load-carrying components inside the belt, are constructed to provide over 100% increase in breaking strength and to "give" under shock loads. Life expectancy of the belt is greater than conventional belts, which is attributed to the extra thickness of the outside cover and improved belt design.

Merge Chemical Companies

Merger of the Resinous Products and Chemical Co. with the Rohm & Haas Co. was approved by the stockholders of both companies on September 15. The former company will continue operations as the Resinous Products Division of Rohm & Haas Co., Washington Square, Philadelphia 5, Penna. The relationships between the two firms prior to the merger had been very close. The controlling stock interest in both companies was held by the same group, and manufacturing and selling operations were interrelated. No change in company policies will result from the merger, the officers and executives of both companies continuing their present functions. The customers of both concerns are expected to benefit from the coordinated laboratory program, the simplification of production, and other economies afforded by the joining of the two organizations.

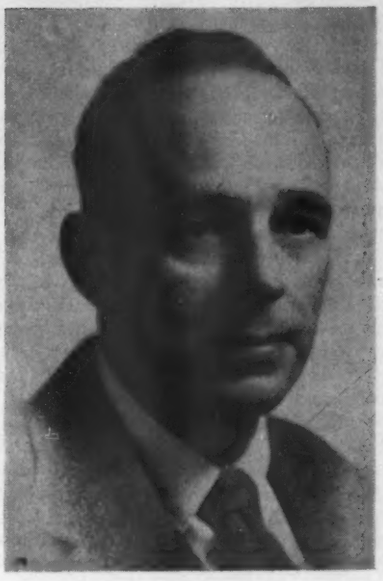
Texon Expands Operations

The Carew Manufacturing Co. mills at South Hadley, Mass., have been purchased by Texon, Inc. The new acquisition will be placed in operation as soon as alterations are completed and new equipment installed for the production of chemically-impregnated fiber. The Carew Manufacturing Co. name is to be retained and the mill will be operated as a division of Texon, whose main plants and offices are located in Huntington, Mass. For about 14 years Texon was a wholly-owned subsidiary of E. I. du Pont de Nemours & Co. In September of last year the key men formed a new corporation and acquired outright the entire operation.

Automotive engineers are employing rubber to replace other materials in the manufacture of automobiles so that approximately 200 rubber parts, in addition to tires, are used today in the production of an automobile, according to Goodrich.

The production of mud-snow tires manufactured by Goodrich has reached the point where for the first time since the war they are in sufficient supply.

Davis Joins Standard Machinery



Ben Davis

Ben Davis, formerly associated with John Royle & Sons and more recently eastern representative of the McNeil Machine & Engineering Co. and the Hartig Engine & Machine Co., has been named sales manager of the Standard Machinery Co. of Mystic, Conn. Edmond Spencer has also joined the company as mechanical designer. At the same time the company announced that it will produce a complete line of extruding machines, including strainers and a diversified line of accessories. Standard Machinery has a completely equipped shop for this type of work with adequate facilities for expansion. The company is now in its 101st year of operation and originally built many of the reciprocating steam engines and boilers used in early steam-powered vessels. Currently the firm is best known as the producer of the Stokes-Standard hydraulic toggle type molding press.

Additional Data on Isotopes

Additional information on the company's use of radio-active isotopes in rubber research was revealed by officials of the B. F. Goodrich Co. at a press preview of the new research center at Brecksville, Ohio, held on September 28. It was indicated that radio-active sulfur is being used in the study of vulcanization to determine the disposition of the sulfur in the final end product. Radio-active iodine is being used to measure the thickness of thin films in the neighborhood of one micron, difficult to measure by more conventional methods. Radio-active phosphorus is being used in several projects, one of which is concerned with improving abrasion and tread wear tests. Use of radio-active iodine, it was stated, is part of a study to determine the mechanism by which silicones reduce the adhesion of ice to rubber-like materials. Goodrich has long been a leader in the development of airplane de-icers.

O'Sullivan Rubber Offers Shares

The O'Sullivan Rubber Corp., Winchester, Va., has registered 325,000 shares of $1 par value stock with the Securities and Exchange Commission. Present holders of common stock will be allowed to subscribe to an additional 278,318 shares at the rate of two new shares for each one now held. The subscription offer was made to stockholders of record as of the close of business on October 7. The remaining 46,682 shares will be offered publicly by the company. R. J. Funkhouser, president of the company, agreed to purchase as many shares as are necessary to boost the proceeds to the company to $300,000. While no underwriter was named, the company appointed C. F. Cassell & Co., Inc., Charlottesville, Va., and Gearhart & Sons Co., Inc., New York, as managers of the offering.

Stabond FR-8 and FR-10

Two sealing compounds which are said to stand up under temperatures as high as 2,800° F. are now in production at the American Latex Products Corp., 921 Venice Blvd., Los Angeles 15, Calif. The compounds, named Stabond FR-8 and FR-10, come in various consistencies, and may be applied by trowel, brush, or extrusion gun. Made from a plastic base, the compounds set at 80° F. to form a hard protective sheath. This covering can be further strengthened by adding perforated glass cloth or a similar material at the time the sheath is formed. The sealing compounds find use as insulating material on electrical junction boxes, heat exchanger couplings, and as lagging for steam pipes and hot-air ducts where resistance to vibration as well as to heat is needed.

General Sells Frostair Division

The Frostair Division of the General Tire & Rubber Co. has been sold to the Deep Freeze Division of the Motor Products Corp., Detroit, Mich., ending the tire firm's interest in the refrigeration field. Frostair, a home refrigerator unit, was manufactured at Morrison, Ill., but this operation will be transferred to Deep Freeze's North Chicago, Ill., plant. Officials of General Tire decided to sell the Frostair line when it became apparent that it would be necessary to increase the line to remain in the appliance business. The purchase by Deep Freeze includes patents, tools and dies.

Correction on Sharples Ad

Due to a typographer's error made in preparing the advertising insert of Sharples Chemicals Inc. which appeared in our September, 1948, issue, it was indicated that Sharples Accelerator 57-1 (zinc dimethyldithiocarbamate) could not only be used as a primary or secondary accelerator, but also that it functioned as a vulcanizing agent and as a retarder for neoprene. The advertisement should have indicated that Sharples Accelerator 57-1 functioned as a primary or secondary accelerator only. A corrected version of the insert is being prepared by the company and will appear in our next issue.

TECHNICAL REPORTS AVAILABLE FROM DEPARTMENT OF COMMERCE

Data on additional reports on industrial and technical developments which occurred throughout the world during the wartime period are listed below. This information is taken from the "Bibliography of Scientific and Industrial Reports," issued by the U. S. Department of Commerce. Orders for reports, at the prices indicated, in *photostat* or *microfilm* type of reproduction, should be addressed to the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D.C. Check or money order accompanying orders for microfilm of photostat reports should be made payable to the Librarian of Congress. Orders for reports available in *printed* form should be addressed to the Department of Commerce, Office of Technical Services, Washington 25, D. C. Check or money order accompanying orders for printed reports should be made payable to the Treasurer of the United States. Titles of the more recent reports follow:

A Study of Combinations of Neoprene with Reclaimed CWS Rubber Scrap and With Ground CWS Neoprene Scrap. By J. Gregory. An investigation of the possibility of incorporating reclaimed CWS scrap or ground CWS neoprene scrap in neoprene faceblank formulations to extend the amount of neoprene available. Report No. PB-L-78634. 15 pp. Photostat, $1; Microfilm, $1.

Synthetic Rubber. By W. J. S. Naunton. Based upon an interrogation of Dr. Roelig and Dr. Bayer of I. G. Farbenindustrie, this report covers the following subjects: German physical test methods; the production of isocyanates, polyester rubbers, coating compositions and adhesives based on di- and polyisocyanates (Desmodurs and Desmophens); and the reactions of acrylonitrile. Report No. PB-L-79316. 37 pp. Microfilm, $1; Photostat, $3.

The Chemical and Technical Basis for the Synthesis of Butadiene at I. G. Ludwigshafen. This document consists of a series of lectures by Dr. Georg Niemann on May 12, 1944, in which the author compares briefly two butadiene processes based on acetylene: (1) via acetaldehyde by addition of water; and (2) via butynediol from reaction with formaldehyde. Flowsheets of the latter process, which was discovered by Dr. J. W. Peppe, are given. Report No. PB-L-60574. 31 pp. Mimeo, $1.

Development of Synthetic Rubber Gas Mask Compound With Improved Low-Temperature Flexibility. By F. S. Gregory, Jr., and others. The object of the work described in this report was to develop a synthetic rubber compound for gas masks which would be suitable for use after long periods of storage at temperatures between —20° F. and +140° F. A bibliography, tables and mixing charts are included. Report No. PB-L-78638. 131 pp. Microfilm, $3; Photostat, $9.

The Use of GR-S as a Substitute for Natural Rubber in Gas Mask Items. By F. Gregory. The development of GR-S compounds which would be usable in gas mask items as substitutes for natural rubber is discussed in this report. Numerous data tables are included. Report No. PB-L-78643. 158 pp. Microfilm, $4; Photostat, $11.

Development of Simple Flexibility Test for Gas Mask Rubber. By John B. Gregory. A simple specification test for measuring the flexibility of rubber at normal and low temperatures was the object of the development work described in this report. Report No. PB-L-78642. 77 pp. Microfilm, $2; Photostat, $6.

Development of Synthetic Elastic Gas Mask Head Harness Webbing. By R. H. Helle. This report describes the development of a satisfactory gas mask head harness webbing constructed with synthetic elastic threads. Fifteen photographs and two tables are included. Report No. PB-L-78645. 59 pp. Microfilm, $2; Photostat, $4.

Economic Vulnerability of the United States: Rubber. By E. G. Holt and others. This report, which was prepared for the Office of the Administrator of Export Control by the Interdepartmental Committee on Rubber, indicates the dependence of U. S. domestic economy on rubber. Recommendations for assuring the supply of this material during emergency periods are made. Report No. PB-L-79253. 67 pp. Microfilm, $2; Photostat, $5.

Purification of Crude Butadiene by Means of Alkaline Formaldehyde Solution or Water. In German. Experiments for the purification of crude butadiene which were conducted by passing the gas through three scrub towers are described in this report. Results of the experiments are compared. Report No. PB-L-65461. 2 pp. Microfilm, $1; Photostat, $1.

Butadiene Purification by Means of Water Scrubbing. In German. This publication comprises (1) a brief report on crude butadiene purification with water scrubbers; (2) a report on the production of polyalcohols from butadiene. oil and crude butadiene gas; and (3) a report describing the separation of butadiene from butylene. In this report the Leverkusen butadiene sulfone procedure is compared with the azeotrophic distillation. Calculations of the production costs in either case and flow diagrams of both procedures are included. Report No. PB-L-65462. 11 pp. Microfilm, $1; Photostat, $1.

Simplification of Butadiene Distillation. In German. The improvement of butadiene distillation associated with drying by means of potassium is discussed in this report. Report No. PB-L-65463. 5 pp. Microfilm, $1; Photostat, $1.

Distillation of Butadiene With Liquefaction of the Distillate By Compression of the Product. In German. In explaining and evaluating this process the following points and factors are described and calculated: (1) cycling of butadiene; (2) dimensions of the column and reboiler, and heat balance; (3) performance of plant and energy balance; (4) power demand for liquefaction through NH_3 cooling; and (5) comparison of energy and plant costs. Report No. PB-L-65464. 7 pp. Microfilm, $1; Photostat, $1.

Exchange of Experiences with Butadiene; Report of a Visit to Schkopau on the 14th and 15th of January, 1942. In German. The experiences reported herein pertain to (1) design, operation and performance of furnaces; (2) separation of the resin; and (3) distillation of butadiene oil; (4) distillation of the recycled butadiene from the polymerization; (5) plant problems; (6) utilization of the potassium hydroxide. Report No. PB-L-65465. 7 pp. Mircofilm, $1; Photostat, $1.

Meeting of Buna Chemists at Kolhof, July 29, 1944. In German. In this report the operation of the electric arc furnace for preparing acetylene and its yield of gas, the processing of the resulting crude gas, and the by-products of the electric arc procedure are discussed. The second part is subdivided into low-pressure gas purification, separation of the gas, and purification of the diacetylene. The third part is subdivided into discussions on carbon, hydrocyanic acid, the polymer of the low-pressure gas purification, the higher aceytlene resulting from the low-cooling purification, aromatic compounds, and hydrogen sulfide from Bentheim petroleum. Tables are included. Report No. PB-L-65467. 11 pp. Microfilm, $1; Photostat, $1.

Production of Butadiene According to the Lebedev Process. In German. This document consists of a report on Russian synthetic rubber, translated from the *India Rubber Journal,* a report on a synthetic rubber plant in the U. S., translated from *Engineering,* and an extract of the Leverkusen literature on synthetic rubber in the U. S. The American and Russian procedures of rubber production are compared with the four-step procedure practiced at Hüls. The reports are accompanied by an exchange of pertinent letters. Comprehensive flow sheets and rough drawings relating to the Lebedev procedure as well as hand-written notes containing computations of chemical reactions and cost-calculations are included. Report No. PB-L-65468. 65 pp. Microfilm, $2; Photostat, $5.

Increasing the Time-Volume Yield in Buna S Polymerization. In German. Discussions on (1) the acceleration of the decomposition of potassium persulfate; 2 the effect of the activating mixture on the speed of polymerization, (3) the significance of the accelerated polymerization for the quality of the polymers, and (4) the results of the production of Buna S and Buna SS, respectively, with increased conversion are discussed in this report. Report No. PB-L-65469. 34 pp. Microfilm, $1; Photostat, $3.

Effect of Sulfurization on Carbon Containing Buna SS Mixtures. In German. Sulfurized Buna SS mixtures were tested with regard to the plasticity of the green mixtures, and to the properties of partially and of completely vulcanized samples. The results are specified. Report No. PB-L-65470. 2 pp. Microfilm, $1; Photostat, $1.

Condensation of Arylolefins with Formaldehyde: First Preliminary Report. In German. This report describes experiments for preparing 1, 3-dioxane derivatives from arylolefins and formaldehyde in the presence of fixed acid catalysts (phosphoric acid on A-carbon). The experiments comprise condensations of formaldehyde with styrene, methyl styrene, indene and transstilbene. Report No. PB-L-65472. 5 pp. Microfilm, $1; Photostat, $1.

Federico Named Vice-President

Albert H. Federico

Albert H. Federico, associated with the C. P. Hall Co. of California as a sales representative since 1946, has been elected vice-president of that concern. Mr. Federico was born in Green Island, N. Y., and received his general education in Cleveland, Ohio, schools. He was graduated from Albion College, Albion, Mich., with a Bachelor of Arts degree. During his college years he was active in athletics and clubs, and was a member of Sigma Nu Fraternity. During 1940 and 1941, Mr. Federico was head football coach at Mendon High School, Mendon, Mich. He also taught physics and mathematics. Mr. Federico served with the U. S. Navy during the war from October, 1941, to February, 1946, with the rank of Lieutenant. He is a member of the Los Angeles Rubber Group and the Los Angeles Paint, Varnish and Production Club.

Goodyear Celebrates Anniversary

The fiftieth anniversary of the Goodyear Tire & Rubber Co. was celebrated in Akron with a three-day program which began on October 6. Some 1700 key executives of the company, several hundred of whom were called home from all over the world, participated in the program. Features of the program were dramatic reviews, motion pictures, and addresses by top company officials. A banquet was given in the company's huge gymnasium. During the course of the program the four hundred and fifty millionth pneumatic tire was produced in one of the Akron plants. The celebration served as a forerunner for anniversary dinners to be held in 54 cities in this country where Goodyear has production or sales operations, and also in all foreign lands represented at the local gathering.

An Index to Volume 63 of RUBBER AGE will be found on Pages 119 to 122 of this issue.

LABOR NOTES

Authorization to strike the Dayton Rubber Co. "if circumstances warrant" was given on September 12 by members of Local 178, URW, in Dayton, Ohio. The union is asking an eleven-cent-an-hour increase. A contract between the two parties was to have expired on October 9, in accordance with Taft-Hartley law provisions for a sixty-day termination notice.

More than 800 production workers at the American Hard Rubber Co. plant in Akron, received an eleven cent an hour wage boost retroactive to June 28, in a new contract signed on September 15. The agreement is to run for twenty months.

Workers at Firestone with fifteen years service or more will receive three weeks vacation with pay starting next summer under terms of an agreement recently concluded between the company and the URW. About 4,100 workers in Akron and several hundred more at Firestone's seven other plants are affected.

A six-week-old strike at the Marietta, Ohio, plastic plant of the B. F. Goodrich Co. ended on September 26 with the signing of a new contract with Local 343 of the International Chemical Workers Union, AFL. The contract provided for an eleven cent an hour wage raise.

A new contract calling for a wage increase of nine and one-half cents an hour and six paid holidays has been signed for 150 members of Local 151, URW, employed at the Cincinnati Rubber Manufacturing Co., Cincinnati, Ohio.

A week-long wildcat walkout, which idled more than 4,000 workers at Plant 1 at Goodyear in Akron ended on September 27. Union and company officials were to meet to discuss the grievance which prompted the walkout, which began when the company changed the time required for a mixer operation.

Firms Drop f.o.b. Pricing

Two of the country's largest producers of plastics materials, Dow Corning Corp., Midland, Mich., and the Bakelite Corp., New York City, have placed their selling prices on a delivered basis, representing steps contrary to the f.o.b. mill pricing policies now practiced by the steel and cement industries under a ruling handed down by the Supreme Court of the U. S. Bakelite announced that effective October 1, it had revised its pricing structure to provide for sales of all its Bakelite and Vinylite plastics products at uniform delivered prices. Dow Corning followed by announcing that all shipments going forward from its plants at Midland, or from its other warehouses about the country, would henceforth be shipped prepaid.

Hydraulic Press Mfg. Co., Mount Gilead, Ohio, has recently issued a new bulletin entitled "Injection Molding Machines" (Bulletin 4802), describing plastic molding machines manufactured by the company.

Sheldon Joins General Latex

George C. Sheldon

George C. Sheldon, formerly associated with Union Bay State Chemical Co. as sales manager, has joined the staff of the General Latex and Chemical Co., Cambridge, Mass., in a similar capacity. Mr. Sheldon was also associated with the General Tire Co. of Boston as sales manager. He is a graduate of Bates College, class of 1925, and of the Harvard Graduate School of Business Administration, 1927. He is a member of Phi Beta Kappa, Delta Sigma Rho and Acacia Fraternity. He has served his community, Lexington, Mass., as a selectman and as president of the Taxpayers' Association.

DuPont Patents For License

E. I. du Pont de Nemours & Co., Inc., announced recently that it is listing a number of its patents on the Patent Register of the U. S. Patent Office as available for licensing. The company said 4,260 patents, which are about two-thirds of the patents the company owns, and which cover many phases of its diversified operations, have been submitted. Study of the company's patents will be continued to determine what additional listings may be made from time to time, and patents not included in the present registration are not necessarily withheld from consideration for licensing. The present list was compiled only from patents granted since January 1, 1933.

Additional Indonex Bulletins

Several additional technical bulletins on the use of Indonex plasticizers in various types of rubber compounds have been made available by the Chemical Products Department, Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Ill. These include the use of Indonex in (1) heat resistant low compression set natural rubber compounds, (2) tire curing bag compounds, (3) carcass compounds, (4) Hycar gasket and packing compounds, and (5) natural rubber of various qualities. Copies of any of these booklets are available without cost on request to the company.

NEWS IN BRIEF

Enjay Co. has made available a reprint of an article entitled "Synthetic Elastomers as Plasticizers for Condensation Polymers," which appeared in the February, 1948, issue of RUBBER AGE.

Construction of a new building in Atlanta, Ga., for U. S. Rubber, which will house both offices and warehouse, is well under way and is expected to be completed and ready for occupancy about the middle of November.

Facts and figures on the use of Pentek, a technical grade of pentaerythritol, in protective coatings have been gathered in an illustrated brochure just published by Heyden Chemical Corp.

J. M. Huber Corp., through its purchasing department, has issued a booklet for distribution by receptionists to salesmen at six company purchasing offices entitled "Let's Get Acquainted."

U. S. Rubber has been awarded a contract to supply 12 miles of conveyor belt for the $100 million Hungry Horse Dam which will be constructed across Flathead River near Devil's Elbow, Montana, under the supervision of the U. S. Bureau of Reclamation.

Production of all types of carbon black during July, 1948, totaled 104,184,000 pounds, compared with 106,596,000 pounds the month before.

U. S. Rubber has entered the apparel cloth field with the production of cotton and rayon fabrics through its textile division at Seaboard Mills, Burlington, N. C.

Prices for zinc pigments which were effective September 1, 1948, have been guaranteed against advance until December 31, 1948, by the New Jersey Zinc Co.

Availability of orthodichlorobenzene technical in quantities as small as five gallons has been announced by Monsanto Chemical Co. This chemical has long been a car lot item in the industry.

Phillips Petroleum has made available a reprint of an article entitled "A New Low Temperature Rubber Made by Antifreeze Method," which originally appeared in *Automotive Industries*.

Spencer Kellogg & Sons, Buffalo, N. Y., is said to be producing rapid drying paints and varnishes by successfully combining styrene with linseed oil.

A booklet on the standardization of carbon, graphite, and metal-graphite brushes for motors and generators, outlining a simple method of saving time and money for all users of motors and generators, is available from the National Carbon Co., Inc., 30 East 42nd St., New York 17, N. Y.

A revised 36 page catalog, number 1101-J, describing in detail the company's complete line of Celectray potentiometer pyrometers, has been published by C. J. Tagliabue Corp., 614 Frelinghuysen Avenue, Newark 5, N. J.

A seven mile belt conveyor system, said to be the world's largest, the machinery for which was designed and manufactured by Hewitt-Robins, has begun the two-year job of transporting an estimated 4,000,000 tons of crushed rock used in the construction of Bull Shoals Dam, Flippin, Ark.

Glamorette, Inc., 250 West 47th St., N. Y., has introduced a new line of infants' shoes, one of the chief features of which is a removable inner cushion of foam rubber which permits the foot to rest completely upon it and is said to avoid irritation.

Sindar Corp. has issued a new price catalog divided into five sections and devoted to odors for industry, aromatic chemicals, germicides and fungicides, stabilizers and antioxidants, and anti-skinning agents.

The use of Indonex and ground scrap in low cost compounds is covered in a recent technical report made available by the Standard Oil Co. of Indiana, Chicago. Ask for Circular No. 13-28.

The AMF Continuous Automatic Mixer for large production of both food and chemical mixes is illustrated and described in a new two-color descriptive data sheet offered by the manufacturer, the American Machine & Foundry Co., New York.

Production of carbon black during June, 1948, was set at 106,596,000 pounds, while shipments totaled 102,114,000 pounds, according to the U. S. Bureau of Mines.

Xylos Forms New Division

In order to provide better service and technical assistance in connection with its distribution of natural and synthetic latices and compounded adhesives, the formation of the Firestone Division has been announced by the Xylos Rubber Co., Akron, Ohio. The new division will take over the activities formerly handled by Firestone Industrial Products and will provide sales service and technical assistance on natural rubber latices and compounds, GR-S latices and compounds, Butaprene latices and compounds, reclaim dispersions, and butyl rubber dispersions. W. F. Jordan will head the Firestone Division as manager of latex sales, and will be assisted by J. P. Seguin and W. W. Madden in the Eastern territory and by J. E. Beyer and C. E. Cain in the Western area.

Tillotson Toy Giraffe

Tillotson Rubber Co., Inc., Needham Heights, Mass., recently introduced a rubber toy giraffe as the first in a planned line of truly flexible toys. Steel wires are molded directly into the neck and legs of the giraffe, thus permitting the child to

bend it into any desired shape. The wires are completely embedded in the rubber so there are no protruding ends to injure the child. High-quality rubber stock and a high-grade of steel wire are used in the construction of the toy. The giraffes are finished in bright colors designed to attract the eye.

Irvington Processing Plant

A new processing plant costing in excess of $2,000,000 has been completed for the Irvington Varnish & Insulator Co., Newark, N. J. One division of the new plant will manufacture "Cap-Seal" liners for bottle caps, while the other will process cashew nut shell oil into a number of commercial and industrial products. The entire project, situated on a 10-acre site fronting Newark Bay, consists of 13 buildings and three tank farms for the storage and blending of process chemicals and cashew nut oil. The products of the cashew nut shell oil process, sold under the trade name "Cardolite," are used in making industrial varnishes, bonding resins, friction fortifiers for the brake lining industry, insecticides, plasticizers and extenders for synthetic resins and rubber.

Patents Issued to Goodrich

Ten patents, all related to new methods of producing chemical compounds which will serve a variety of industrial uses, have been issued to the B. F. Goodrich Co. The compounds are a result of newly invented reactions with beta-proprio-actone, a chemical product introduced by the B. F. Goodrich Chemical Co., a year ago. The compounds will be used in a wide field of production including the preparation of plastics, synthetic rubbers, and plasticizers. End products in which they will be used vary from weed killers to compositions used to increase the wear of leather.

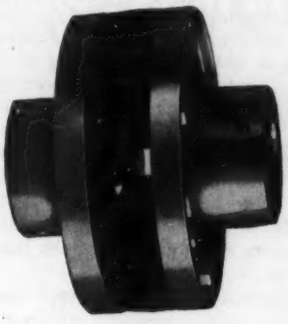
National Lead Buys Titanium

The National Lead Co. has acquired the Titanium Alloy Manufacturing Co., with offices in New York, and a plant at Niagara Falls, N. Y. The acquisition will be operated as a division of the parent company. Titanium produces zirconium compounds for the ceramics industry, and alloys of titanium for the ferrous and nonferrous metal industries. Latest developments have uncovered new uses for the Titanium firm's products in radar, radio and television, according to recent reports.

NEW RUBBER GOODS

Lord Multiple H.P. Couplings

The Lord Manufacturing Co., Erie, Penna., has announced a new line of Multiple H.P. Couplings from 2 to 100 h.p. at 1750 r.p.m. The complete line is now



available in 17 sizes from 1/50 to 100 h.p. at 1750 r.p.m. 1/50 to 15 h.p. couplings have 15° torsional deflection under rated load. Sizes 30 to 100 h.p. have 3°. It is claimed that this high deflection gives unusual vibration isolation. Couplings will accommodate at least 2° angular and 1/32-inch parallel misalignment. Neoprene flex-

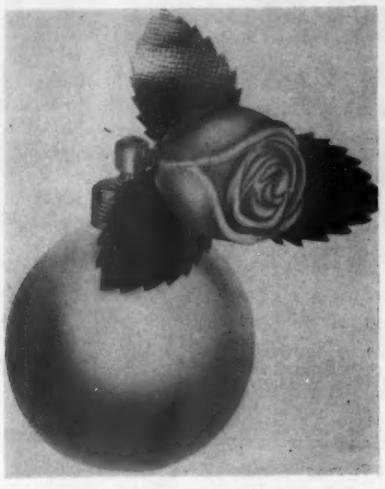
ing elements operate in shear and are bonded to steel plates. Since there are no bearing surfaces to chafe, the couplings are permanently quiet, require no lubrication and are unaffected by such abrasives as emery, sand, crushed rock or metal particles.

Adjustable Radiator Hose

Miller Rubber Division of the B. F. Goodrich Co. has introduced a new universal curved radiator hose that serves 77 percent of all cars with only four sizes. Outstanding feature of the new product is a red marking tape that runs the entire length of the hose. The red tape is marked off with letters and numbers, thus enabling quick and accurate cutting for many models of cars from any one of the four universal pieces. Directions are printed on the label and no reference charts or other instructions are necessary. The service man need only check the label to determine which letter or number to cut to fit the hose to any model car.

Kayspray Perfume Atomizer

Molded Latex Products, Inc., Paterson, N. J., has introduced the Kayspray atomizer, said to be an innovation in the field of perfume atomizers. Seamless, of pure natural rubber latex, the bulb is molded



in the shape of a rosebud by the patented Kaysam process. The color is dyed right in the rubber, and the life-like leaves are of plastic. Available with straight or curved arm and in assorted bottle and bulb colors, all mountings for the atomizer are 24 carat gold-plated, hand polished, with interchangeable, easily removed tops.

Roly-Poly Humpty-Dumpty

The latest toy creation introduced by the Seiberling Latex Products Co., Akron 9, Ohio, is the Roly-Poly Humpty-Dumpty. Featuring a sculptured design, the new item has triple play appeal—rock,

Humpty Dumpty sat on a wall
Humpty Dumpty had a great fall
But he bounced and he rocked and he whistled away—
nothing hurts Humpty Dumpty. Hurrah!
HUMPTY DUMPTY

bounce and whistle. It is decorated with beautiful non-toxic colors and comes packaged in a colorful individual box featuring illustrated Humpty-Dumpty poetry. A sales-attracting display pedestal is included in each individual package.

Gerber Vinyl Play Dolls

Life-like play dolls made of vinyl plastic, designed to fit doll-house furniture, have been developed and introduced by the Gerber Plastic Co., 308 South 8th St., St. Louis 2, Missouri. In addition to being flexible and unbreakable, the dolls are easy to wash, have skin-like texture,

and are furnished in both sitting and standing positions. Each doll is hand painted in vivid, non-toxic colors. They come in both blonde and brunette styles, the lips being a natural pink and the eyes a vivid blue. Some of the Gerber vinyl dolls feature molded clothes. They are sold either as individual units or in four-unit cartons. Injection molded, the dolls are made from a high speed vinyl made exclusively for the company. The material cycles as rapidly as 120 shots per hour and is made on standard 9-ounce injection molding presses. Incidentally, the company is offering the special vinyl material used for these dolls to injection and extrusion molders at reasonable prices.

Press-Fuse Collar Lining

A new collar lining material called Press-Fuse has been introduced to manufacturers of men's shirts by a subsidiary of J. P. Frank and Co., 40 Worth St., New York City. The collar lining material is calendered plastic film made from a special formulation of Geon polyvinyl chloride resin. Sold in rolls to shirt manufacturers, the lining is first die-cut to shirt collar shape, placed between two layers of cloth fabric and then fused to them under steam pressure of 65-75 pounds and 75-85 p.s.i. plate pressure. The process is said to prevent shrinkage and minimize wrinkling of men's shirt collars.

Plastic Rubbers For Children

The Bakelite Corp. has announced the manufacture of a line of children's rubbers made of the company's Vinylite plastic. The rubbers are being made by Plasti Industries, Winona, Minn. Made in gay colors, it is claimed that this new protective footwear is so flexible that a pair can be slipped into pocket or school bag and that they are sturdy enough to withstand hard scuffing. A line of the same type will be made in women's sizes, in colors to harmonize with stormy day outfits.

LOS ANGELES NEWS

At the technical session of the October 5 meeting of the Los Angeles Rubber Group held at the Mayfair Hotel, Los Angeles, Calif., William Wiard of the Dow Corning Corp., Midland, Mich., spoke on "Silicones as New Engineering Materials for the Rubber Industry." In his address, Mr. Wiard noted that the history of silicones goes back as far as 1901, and that they are semi-inorganic chemical hybrids, based on alternate silicon-oxygen linkages. The unusual heat stability and chemical inertness of the silicones can be attributed to this polymer structure, he said.

Mr. Wiard outlined the background of the Dow Corning Corp., and discussed present methods of manufacture of silicones. The four general groups of commercial silicones were separated as to chemical and physical properties. The fluids and an emulsion made from the fluids were described in regard to their uses in the rubber industry and a new technique, now under development, involving the application of one of the fluids to the outside of uncured tire casings was mentioned.

The final topic, Silastic, Dow Corning silicone rubber, was described in greater detail as to chemical and physical properties. Mr. Wiard noted that its outstanding resistance to heat and cold has been demonstrated by tying a series of knots in an extruded ribbon of Silastic, one end of which had been buried in dry ice for several hours at —100° F. and the other end resting on a hot plate at over 500° F.

The characteristics of Silastic as to oil and chemical resistance and the methods of fabrication were discussed. The speaker also made some mention of its military and commercial uses. The talk was illustrated with a number of slides showing technical data and commercial applications of the silicones.

The general meeting of the Group which followed the regular dinner was sponsored by the Firestone Tire & Rubber Co., with Leonard Firestone as host. Mr. Firestone commented at length on the benefits and fine work the Los Angeles Rubber Group was doing in the promotion of good will and better understanding among the men and organizations engaged in the rubber industry in the Los Angeles area.

Colonel B. S. Mesick, in charge of research and development of solid fuel rockets for the U. S. Army at the California Institute of Technology, spoke on the military application of jet propulsion. Information as to the research work being done at White Sands, New Mexico, was given by Colonel Mesick, who followed his talk with the showing of two motion pictures taken by the Army which outlined the manufacture and assembly of the rockets. The films also showed the actual firing operation of the rocket.

W. M. "Bill". Moser, formerly associated with the Pharis Tire & Rubber Co. as technical director, has joined the Kirkhill Rubber Co. in the same capacity.

Appointment of Hawxhurst & Co. by the Ferro Chemical Corporation of Cleveland, Ohio, as sales agent for the California territory was recently announced. Products featured by the Ferro concern for the rubber, plastics, paint and other industries include metallic soaps, driers, stabilizers, cobalt salts and fungicides. Hawxhurst & Co. maintain offices at 609 South Grand in Los Angeles and the Mills Tower in San Francisco. Complete warehouse stocks will be carried in both cities.

The Fall Golf Tournament of the Los Angeles Rubber Group was to have been held on October 8 at the Hacienda Country Club, La Habra Heights, Los Angeles.

Bert Dalton, formerly of MacClatchie Manufacturing Co., has joined the Franklin Rubber Co.

Gordon A. Boelter has resigned his position as plant manager of the Goodyear Synthetic Corp. to accept the position of vice-president in charge of production for Standard Perlite Corp.

Durez Plastics Check Chart

Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y., has made available a check chart in slide rule form as a handy reference for engineers, designers, molders' representatives, etc., who have occasion to specify plastic materials. This chart covers only the Durez phenolic materials for a number of typical suggestive applications. As the slide is pulled to the desired application, the Durez material number recommended appears in one of the cutout windows and typical physical property figures appear near this number. On the back are several engineering tables such as temperature conversion, weights, and cubic equivalents. In addition, the slide reveals specific gravities of various structural materials for comparison with specific gravities of Durez. The chart may be obtained on request from the company.

Constructing Laboratory Building

To house additional laboratories required for its expanding research, Battelle Memorial Institute, Columbus, Ohio, will begin construction of a new half-million dollar laboratory building late this year. The structure, according to Director Clyde Williams, is scheduled for completion in 1949. This major addition to the Institute will be the largest of four laboratory structures erected by Battelle since World War II. It will be built of concrete and steel, with brick veneer finish, and will harmonize in architectural detail with other Institute buildings. The three-story structure will contain space for 103 unit laboratories, plus large open areas for pilot-plant operations. It will contain approximately 80,000 square feet of space.

Tex-Rite Inks for Rubber

Tex-Rite Products Co., 1941 West Fort, Detroit 16, Mich., are currently marketing special inks for marking rubber. Developed during the war, the inks are said to be in wide use and to mark excellently on cured or uncured rubber, as well as on all leather goods.

Called Tex-Rite inks, two types are available in two viscosities, one (No. R-610-H) being specifically suited for stamp pad marking, and the other (No. R-610) having been developed for use in a special marking pen sold by the company. The colors of both inks are not vivid, due to the fact that coloration is obtained by the use of vegetable dyes.

The efficiency of the Tex-Rite inks is said to be obtained by the use of natural rubber dissolved in suitable solvents. Benzol may be used as a reducing agent and in this connection they are similar to rubber cement and other rubber products. The drying time varies with the viscosity of the ink used and the thickness of the coat applied. A thin film will naturally dry much more rapidly than a thick heavy application.

The company states that care should be exercised in the selection of stamp pads used with Type R-610-H. An all-felt pad should be used rather than the regular rubber stamp pad, this precaution being necessary because rubber stamp pads are made with a rubber base and the solvents used in the ink will react unfavorably on this type of pad. For the same reason, stamps with metal type should be used instead of the conventional rubber stamps.

Set Materials Handling Show

The Third National Materials Handling Show will be held at Convention Hall, Philadelphia, Penna., January 10-14, under the management of Clapp and Poliak, 350 Fifth Avenue, New York 1, N. Y. The show is said to be one of the five largest annual industrial expositions to be held in this country. One hundred and ninety-two companies have leased 96,725 square feet of net exhibit space and the remaining 16,000 feet are expected to be occupied when the show opens. This year the show will be jointly sponsored by the management and materials handling divisions of the American Society of Mechanical Engineers and the Material Handling Institute. The A.S.M.E. groups will conduct a five-day conference on materials handling concurrently with the exposition.

Polystyrene P-8 Plastic

The Chemical Division of Koppers Co., Inc., has introduced a new high heat-resistant, low-shrinkage polystyrene plastic called Polystyrene P-8 which is said to offer three important characteristics not previously attained in material of this type. It is said to be the first high heat-resistant polystyrene that can be molded into a glass-clear product as well as in many different colors. It molds as easily as higher grades of polystyrene, and when made in colors shows great resistance to fading. The material is expected to find use in the molding of knife and fork handles, and in other household utensils.

What the Reviewers Say About the New Book,

"RECLAIMED RUBBER"

The Story of an American Raw Material

by **JOHN M. BALL**

★★★★★★★★★★★★★★★★★★★★★★★

CONTENTS

1. Early History
2. Mitchell and the Acid Process
3. Marks and the Alkali Process
4. Miscellaneous Reclaiming Processes
5. Companies and Associations
6. Scrap Rubber
7. Manufacture
8. Properties and Uses
9. Statistics
10. World War II

Epilogue: What of the Future?
Bibliography
Index

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CANADIAN NEWS

R. M. Ferguson & Co., of Toronto, has been appointed sales agent in Canada by the Spender Products Co. of Paterson, N. J., for Ridacto, its accelerator activator. The Ferguson concern, headed by Ralph Ferguson, for many years associated with the St. Lawrence Chemical Co. and later with the Naugatuck Chemical Division of Dominion Rubber Co., is now representing a number of American companies supplying materials to the rubber, plastic, ceramic and allied fields in Canada. Offices are maintained at 66A Roslin Ave. in Toronto.

A new crown company has been created by the National Research Council to make available to industry through licensing arrangements the inventions, new processes, and improvements in processes developed by the scientific workers of the council. Provision is also made for the development of processes devised by university research workers and for the transmission to interested industries of inventions developed by university research workers.

President C. J. Mackenzie of the National Research Council said in outlining the duties of this new company: "I have purposely stressed the obligations which rest on private industry and government laboratories to see to it that the useful results of research are applied as soon as possible."

It is expected that 1,300 enemy patents now held by Custodian of Enemy Property will be made available to Canadian Patents and Development, Ltd., and then to Canadian industry for development.

Thomas W. Hall, who joined the organization in 1925, has been appointed manager of the Toronto branch of A. Schrader's Son Division of Scovill Manufacturing Co., succeeding the late Allan Rae. Prior to joining Canadian Schrader Mr. Hall had wide experience in the Canadian banking field. The company also announced that George A. Warlow, who has been connected with Canadian Schrader for more than 19 years, and who is well known throughout the Canadian rubber and automotive industries, has been appointed Canadian sales manager.

William J. Michaud Co., Ltd., has been appointed Montreal agent of the Allied Asphalt & Mineral Corp., New York, and will represent that company in the distribution of its pitches, gilsonite, waxes, and other products. The Montreal concern has been operating as a manufacturer's agent in the industrial chemical field for some twenty-five years. The appointment was announced by George J. O'Sullivan, vice-president and general manager of Allied Asphalt.

Permission was recently granted to change the name of the British Rubber Co. of Canada, Ltd., to the Mailman Corporation, Ltd. A new company has been incorporated under the name of the British Rubber Co., Ltd., to operate the rubber division of the new Mailman Corp. The British Rubber Co., Ltd., will operate in the same manner as the previous company of similar name without change of policy, personnel or products.

Boss Addresses CCDA Meeting

The Commercial Chemical Development Association meeting held on October 5, in the auditorium of the Mellon Institute, Pittsburgh, Penna., included a series of papers and an inspection trip through the Institute. Dr. A. E. Boss, Manager of Pigment Sales, Columbia Chemical Division, Pittsburgh, Penna., spoke on "Adaptability—A Tool For Production Development." Dr. Boss discussed some of the important characteristics necessary for a non-carbon, rubber-reinforcing pigment, such as particle size and shape, specific gravity, color, dispersability, wettability and effect on cure. He then traced the developments of three such pigments. Other papers presented at the meeting included "The Story of Plaskon," by Dr. M. H. Bigelow (Libbey-Owens-Ford); "Educational Training For Chemical Development," by Dr. W. N. Jones (Carnegie Institute); "Which Develops First, the Chemical or the Market?" by Dr. H. B. McClure (Carbide & Carbon), and "Calgon—A Chemical Development from a Non-chemical Background," by Dr. E. P. Partridge and C. R. Texter (Calgon, Inc.).

Smith Named Hy-R-Speed Agent

The firm of Holland W. Smith, Inc., New York City, has been appointed exclusive sales agents of Hy-R-Speed, Inc., San Francisco, Calif., for the states of Maryland, Delaware, New Jersey, New York and Pennsylvania east of Harrisburg. The Smith Company will acquaint the trade with the new "Double Egg Beater" action mixer and the new model R-50 Hy-R-Speed Mill. In the states mentioned, inquiries as to sales or service on mixers or mills may be addressed to Holland W. Smith, Inc., Empire State Bldg., N. Y.

Automobile Facts and Figures

The Automobile Manufacturers Association has published the twenty-eighth edition of *Automobile Facts and Figures*, which marks the production of 100,000,000 motor vehicles since the beginning of the industry fifty-odd years ago. In general, the booklet enumerates the accomplishments of the industry during 1947, and the effect upon the nation's economy and well-being motor transport brings.

CONVEYOR BELTING BACKLOGS INCREASING DUE TO ERP NEEDS

According to trade circles, backlogs have started to increase for larger sizes of conveyor belting, rubber hose and mechanical rubber goods. Much of the increased demand is a result of European Recovery Plan requirements, now coming through from European agents in larger volume.

Sales have already increased enough so that deliveries have changed on the most plentiful sizes from a sixty-day to a ninety-day or more schedule, while a few varieties are tight and cannot be delivered in less than six months. Further increases in backlogs during the fourth quarter are indicated by the growing volume and size of inquiries, indicating that a long term era of materials handling mechanization is developing.

Orders being received are firm commitments because large belts are usually made to order for specific installations. Present trends indicate that much of the business now being entered in sales books is the result of large engineering research surveys of materials handling costs. Because of a number of refinements in design, many of the installations will pay for themselves in a relatively short period of time, and in addition, will provide mass production of materials in locations heretofore considered inaccessible.

New types of belts introduced by several companies during the past two years now permit heavier belt loading, lower repair and maintenance costs, steeper inclines, longer flights and more rapid discharge. These advantages, coupled with longer belt life, have vastly expanded the fields of application of underground, outdoor and indoor types of belts.

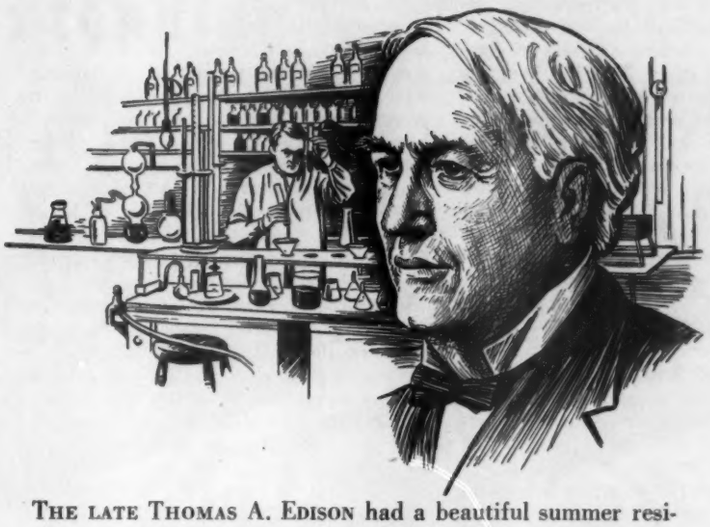
Costs of operation are also reduced because the ratio of belt weights to product weights has been reduced, it was learned. These improvements reduce the amount of power required for operation of the conveyors, per ton of material conveyed.

Manufacturing Titanium Metal

E. I. du Pont de Nemours & Co., Inc., has begun the small scale manufacture of titanium metal, a new basic raw material for industrial development. A pilot plant of 100 pounds daily capacity has been placed in operation at the Newport, Del., plant of the Pigments Department. The company claims that this is the first time that ductile titanium metal has been produced for commercial exploration. The U. S. Bureau of Mines has been producing the metal for research purposes. The silver-white metal is light and strong. It is highly resistant to corrosion and has a higher melting point than the commonly used metals. It is comparable to stainless steel in strength and corrosion resistance, but weighs only a little more than half as much per unit of volume. It is less than twice as heavy as aluminum, but several times as strong, in bars of comparable dimensions. The metal is expected to find use in airplane and other transportation production where a high ratio of strength to weight is needed.

TALES WORTH RETELLING

(No. 9 of a series)



THE LATE THOMAS A. EDISON had a beautiful summer residence in which he took great pride. One day he was showing the guests about, pointing out the many labor-saving devices on the premises. Their path led them through a turnstile which, the guests soon found, was especially hard to operate.

"Mr. Edison," asked one of the guests, "how is it with all these modern improvements you still maintain such a heavy turnstile?"

Said Mr. Edison, his eyes lighting up with laughter, "Well, you see, everyone who pushes that turnstile around pumps eight gallons of water into the tank on my roof."

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OBITUARIES

Reid L. Carr

Reid Langdon Carr, sixty-seven, president of the Columbian Carbon Company and former law partner of Samuel Seabury, died on October 7 at his home in New York City, after a short illness. Mr. Carr was born at Cornwall, Vt., the son of the late Anson K. and M. Louise Langdon Carr. He was graduated from Middlebury (Vt.) College in 1901 and obtained his law degree from the New York Law School in 1903. Mr. Carr received the degree of Doctor of Laws from Middlebury, of which he was a member of the board, in 1944.

Following his graduation from law school Mr. Carr was an instructor at the New York Law School from 1903 to 1916. In 1905 he had become a member of the law firm of Morgan & Seabury, a post he held until 1907. From 1907 to 1921 Mr. Carr was a member of Morgan, Morgan & Carr, and from 1921 until 1940 a member of the firm of Clark, Carr & Ellis.

Besides being president and a director of Columbian Carbon, he held similar offices in the Columbian Fuel Corporation, the Coltexo Corporation, Southern Gas Line, Inc., Southern Carbon Company, Pineville Gas Company and the Magnetic Gas Company. Mr. Carr also was a director of the Arkansas, Louisiana & Missouri Railroad Company, Irving Trust Company, Frederick H. Levey Company, Peerless Carbon Black Company, Carbon Black Export, Inc., Interstate Natural Gas Company, Columbian-Phillips Company, D. Appleton-Century Company and the Mississippi River Fuel Company.

Mr. Carr also was a trustee of Middlebury College. He was a member of the New York Bar Association, the Association of the Bar of New York City, the New York State Chamber of Commerce, the Sons of the American Revolution, the Society of Colonial Wars and many other organizations. He was a member of the board of the New York Institute for the Education of the Blind. His clubs included the Union, Metropolitan, Union League, Uptown and Church, the National Golf Links of America and the Bald Peak Country Club of Bald Peak, N. H. His wife survives.

Allan Rae

Allan Rae, branch manager of A. Schrader's Son Division of the Scovill Manufacturing Company at Toronto, Canada, died on August 28 of a heart attack. Prior to joining the Schrader Canadian organization in 1933, he was associated with the Dunlop Tire & Rubber Goods Co., Ltd., for thirteen years. Mr. Rae was a member of the Canadian Society of Automotive Engineers, the Automotive Suppliers Manufacturers Association, and the Canadian Manufacturers Association. His wife, a daughter and a son survive.

Samuel E. Sheppard

Dr. Samuel E. Sheppard, retired research scientist of the Eastman Kodak Co., died at his home in Rochester, N. Y., on September 29, at the age of 66. A native of Kent, England, Dr. Sheppard was known internationally for his chemical research, being the holder of awards from photographic and chemical societies in several nations. He joined the staff of Eastman Kodak in 1912, and at the time of his retirement in January, 1948, was assistant director of the research laboratories. Dr. Sheppard was known to the rubber industry for the development of a process for electrically depositing rubber on metal. He extended the importance of this discovery by working out a method for commercially coating metal objects with a thin sheet of rubber. He was also active in developing colloidal fuels which were used during the first World War.

Thomas A. Desmond

Thomas A. Desmond, associated with the rubber industry for forty-seven years, and one of the founders of the New York Rubber Exchange, now the New York Commodity Exchange, died at his home in Summit, N. J., on September 18. He was 64 years old. Mr. Desmond was known in the rubber trade as a pioneer in the infant industry at the turn of the century. At the time of his death he was president of T. A. Desmond Co., Inc., 33 Rector St., New York City. Mr. Desmond was a founder and a member of the Downtown Athletic Club in New York City, and a member of the Selective Service Appeal Board of the State of New Jersey. He was also a life member of the Elks. His wife and two sons survive.

William B. Lawson

William B. Lawson, president and treasurer of the Ferro Chemical Corp., died on September 29 when he was thrown from a horse while fox hunting in Chesterland Township near Cleveland, Ohio. Mr. Lawson was a director of the Ferro Enamel Corp., of which his own company is a subsidiary. He became affiliated with Ferro Enamel when a firm of his own, W. B. Lawson, Inc., merged with Ferro Chemical. Previously he had been associated with the Harshaw Chemical Co. for 10 years, where he was executive vice-president when he left to form his own business. Born in Hurley, N. Y., Mr. Lawson had also been associated with the International Nickel Co. for twenty-five years.

An Index to Volume 63 of RUBBER AGE will be found on Pages 119 to 122 of this issue.

George A. Blackmore

George Augustus Blackmore, chairman of the board and chief executive officer of the Westinghouse Air Brake Co., Wilmerding, Penna., and the Union Switch and Signal Co., Swissvale, Penna., died on October 2 in Allegheny General Hospital, Pittsburgh, Penna. He was 64 years old. Mr. Blackmore was born in Wilkinsburg, Penna., and attended the public schools in that area. Associated with the companies he headed for all of his business career, Mr. Blackmore became president and chairman of the Westinghouse company in 1940. He was elected president of Union Switch in 1936, later becoming chairman of the board. He was a director of various affiliated corporations and of the Mellon National Bank and Trust Co. His wife, two daughters and a son survive.

Herbert C. Kemble

Herbert C. Kemble, chemical engineer in charge of rubber development, components and materials branch, Squier Signal Laboratory, died recently in Long Branch, N. J. Death was caused by a cancerous condition. Mr. Kemble was a member of the Division of Rubber Chemistry, A.C.S., and was active in the Monmouth County Section of the society for many years.

Restfoam Mattress Topper Pads

With the completion of expanded production facilities at its Buffalo, N. Y., latex foam plant, the Hewitt Restfoam Division of Hewitt-Robins, Inc., recently announced the inauguration of its long-planned mattress topper pad program to make Restfoam cushioning available to bedding manufacturers. The new $850,000 addition to the Restfoam plant is already turning out mattress topper pads in full and twin bed sizes, as well as a special hospital size. The new facilities are expected to double the company's latex foam capacity, company officials stated.

Acquires Central Scientific

Cenco Corp., an eastern group headed by E. Perry Holder, chairman of the board of the American Bosch Co., has purchased the Central Scientific Co., Chicago, Ill., manufacturer of laboratory apparatus, instruments and supplies, for an undisclosed sum. Cenco was recently organized to buy the Chicago company. It has an authorized capital of 2,500,000 shares of $1 par common stock. The new owners do not intend to make any changes in the personnel of the Chicago company.

Kelly Rubber Expands Plant

Kelly Rubber Co., Massillon, Ohio, revealed recently that it is planning two additions to its present plant at 515 26th St., SE, in Massillon. City building permits have been issued to the company for construction of the two units which are expected to add about 1,500 square feet of floor space to the present plant. Estimated cost of construction is $75,000.

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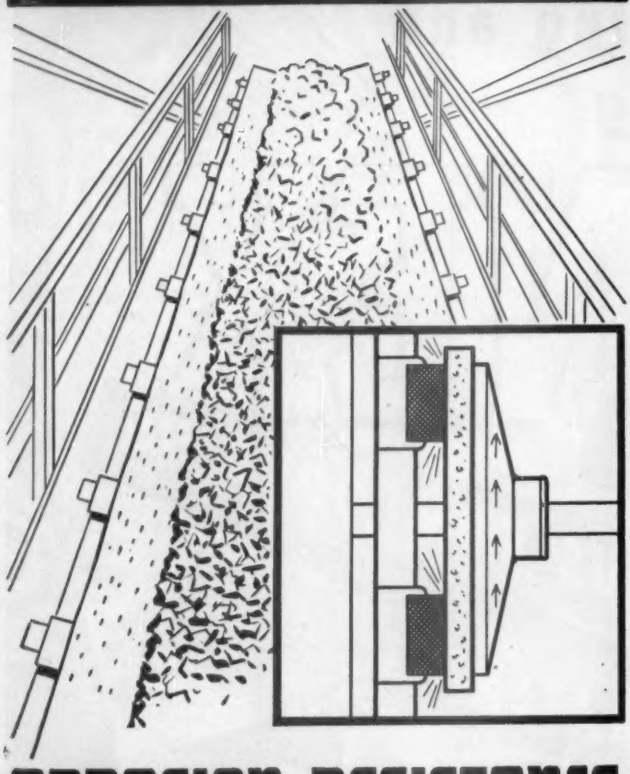

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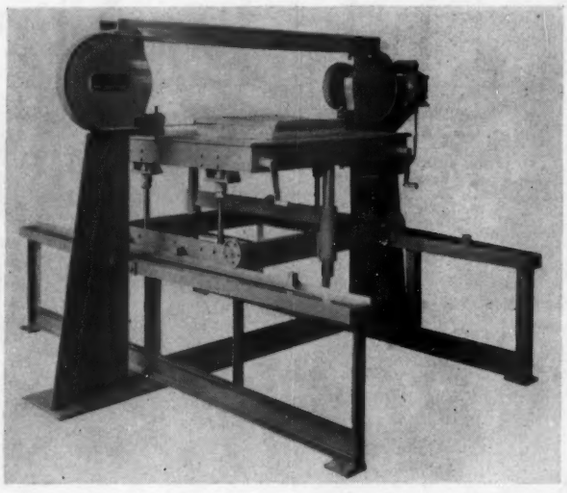
NEW EQUIPMENT

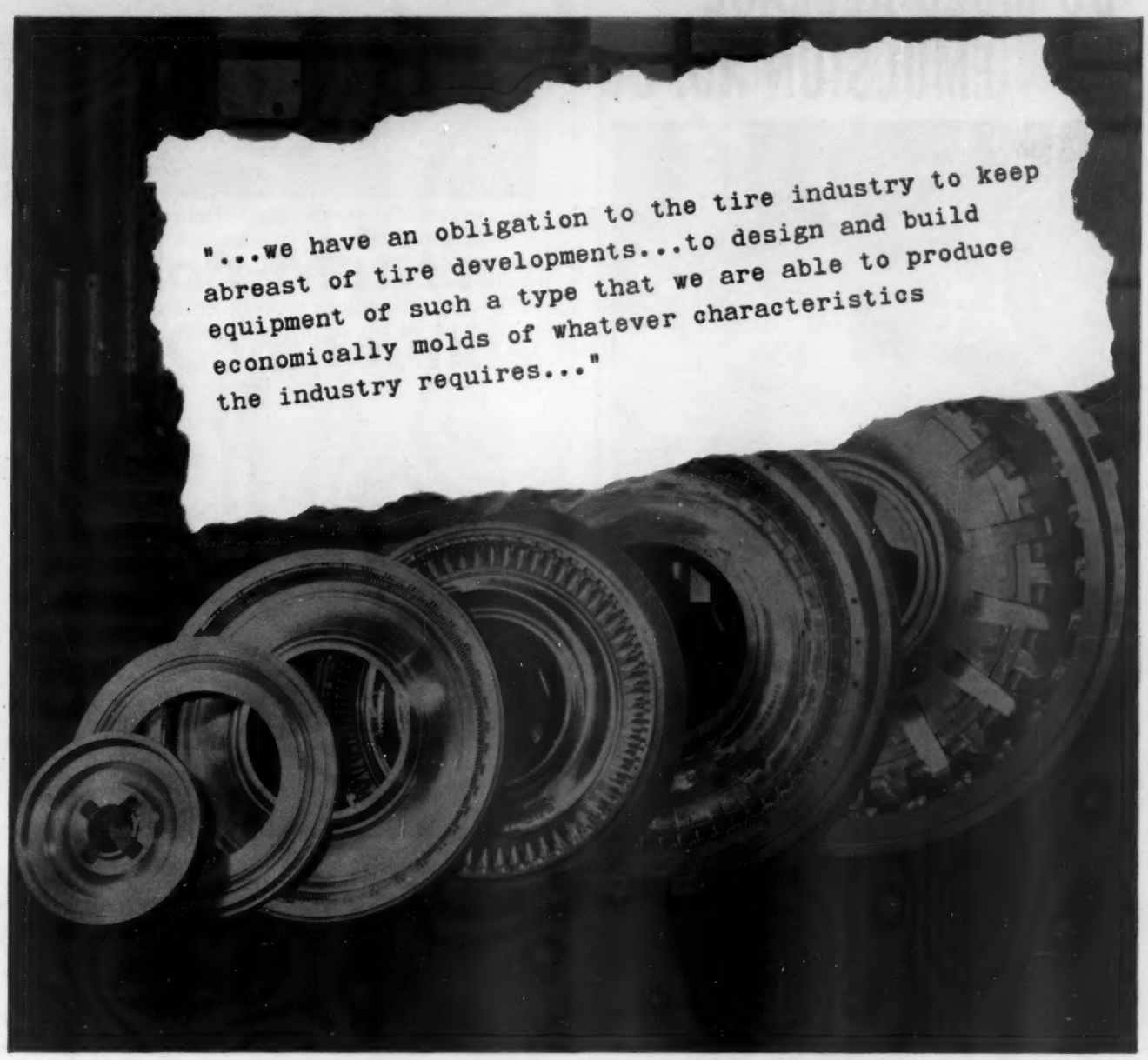
Foam Rubber Cutting Machine

The Campbell Foam Rubber Cutting Machine, designed for users of foam rubber for cushions and seats, armrests, vibration mounts, etc., has been introduced. Designed by the Campbell Machinery Development Co., the machine is being manufactured and sold by the Falls Engineering & Machine Co. of Cuyahoga Falls, Ohio. Sheets of rubber to 42x42 inches can be sliced to quarter-inch thickness on the new cutter. Concave and convex cuts on the full width of the stock are made by adjusting the table top of the machine which will tilt 15 degrees horizontally and will move 8 inches vertically. The table top moves on a roller carriage under a saw blade. One hand wheel adjusts the table for vertical movement and two hand wheels regulate the degree of tilt. The top is wood, re-inforced with angle iron. Two 14-inch band saw wheels are mounted on a structural steel frame with the saw operating horizontally. One wheel is driven by a ¾-horsepower motor. The other is not powered and is adjustable for tensioning the saw blade. Except at the cutting edge the blade is fully guarded.



Multi-Record Dynalog Recorder

Shrouded in deep secrecy during the long period of its development and field-testing, the Multi-Record Dynalog Electronic Recorder of the Foxboro Company, Foxboro, Mass., was exhibited for the first time at the recent I.S.A. Instrument Show in Philadelphia. It is a high-speed instrument, completely electronic in principle, making from one to six different records on one circular chart, the records being of colored dots so closely spaced as to make virtually continuous lines. The Recorder has only one measuring system, either resistance bulb or EMF type, but a positive-acting switching unit automatically brings the vari-colored pens into recording position at 6-second intervals, in any sequence desired. The sequence and number of points may be changed at will, quite easily. Complete color-coding prevents possible mis-mating of circuits and pens.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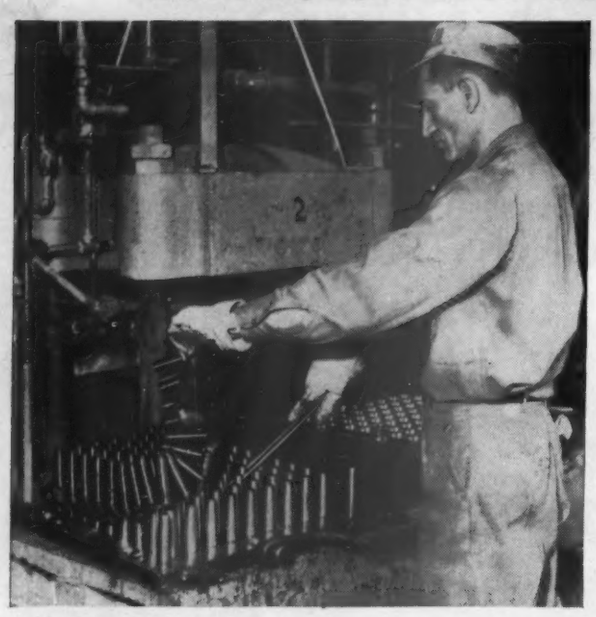

PHOTO COURTESY ANCHOR RUBBER PRODUCTS, INC.

Mold maintenance on this 81 cavity and precision pin mold was reduced to a minimum by using DC Mold Release Emulsion No. 35.

keeps mold clean 16 times as long

The experience of Anchor Rubber Products, Cleveland, Ohio, is a fine example of the savings which result from using DC Mold Release Emulsion No. 35. Prior to using this silicone release agent, they had a real problem in mold maintenance. A particular 81 cavity mold with precision pins for each cavity had to be disassembled and cleaned once a week in order to get satisfactory production. Ordinary lubricants carbonized and formed a build-up on an undercut portion at the base of the pin and on the plate. This build-up produced poor moldings, increased scrap and made weekly mold cleaning essential.

Removal of this carbonized soap was complicated since the pins had to be removed to do a thorough job. Replacing the pins after cleaning was also difficult and required hammering to align and seat the pin properly. The burrs left after hammering were then smoothed out with a grinder. But grinding shortened the pins to such an extent that the button flash on the end of the molding could not be removed. Then the pins had to be replaced.

Since using Dow Corning Mold Release Emulsion No. 35 as a mold lubricant, Anchor Rubber Products has used this same mold four months without cleaning. They simply dilute the emulsion 100 times with water and spray the mold.

In your plant, as in Anchor Rubber Products, there is no need to spend excessive amounts of time, money and labor for mold maintenance and cleaning. Dow Corning Mold Release Emulsion No. 35 neither carbonizes nor forms a build-up on the mold even after hundreds of hours at molding temperatures. It is clean to use and easy to apply.

DOW CORNING CORPORATION, MIDLAND, MICHIGAN

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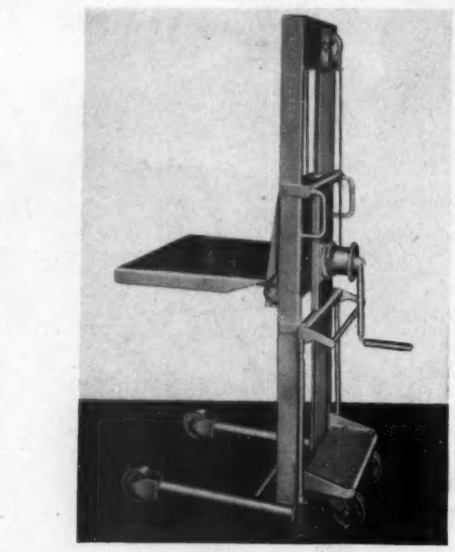
Los Angeles: 1514 S. Hope St. • New York: Empire State Building
Dallas: 1617½ Elm St. • Atlanta: 34 North Ave. N.E.
Canada: Fiberglas Canada, Ltd., Toronto
England: Albright and Wilson, Ltd., London

FOR MORE INFORMATION ABOUT DC MOLD RELEASE EMULSION NO. 35, PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR LEAFLET NO. V 6-8.

Dow Corning
FIRST IN SILICONES

Lewis-Shepard Handy Hoister

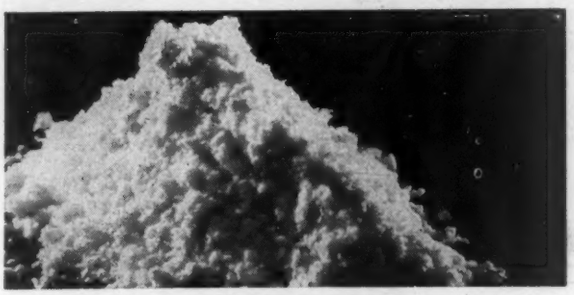
The CH Handy Hoister, a new light-weight, rugged stacker, has been introduced by Lewis-Shepard Products, Inc., of Watertown, Mass. Designed especially to key into manufacturing processes requiring the lifting, lowering and transporting of tools and raw materials, the full utility value of the new unit is said to be best exploited in lifting loads to working height for convenient reach of the workman, and in transferring or carrying materials to or from bench, press or other machine. Crank-up-crank-down operation through planetary gear drive winch permits lacing and holding the platform at any level. One revolution of the winch handle gives a full 3-inch lift. Two floor locks, one at each side of the upright members, are operated by a single handle at convenient height and hold the stacker firmly in position when loads are being raised, lowered or moved on and off the carriage. The company stocks the Handy Hoister in a standard size of 500-pound capacity, having a 24x24-inch lifting platform.



FOR FURTHER DETAILS, SEE AD ON PAGE 4

Rayco Fillers

For Non-Marking Sole Compounds



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Early in our pioneering efforts as flock producers, we recognized that the special needs of the Rubber Industry call for a special group of fillers. Here in "Filfloc" is a product developed specifically to enhance strength, as well as impart non-marking qualities. Through experience and joint research with you, we furnish various types of "Filfloc" to meet EXACTLY your needs for compounding crude, synthetic or reclaim.

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To meet the many requests for information concerning Royle "Popular Size" Extruding Machines, a fully illustrated, quick reference bulletin has been prepared describing the Royle # 2, # 3, and # 4 extruding machines — the extruders most commonly associated with current extrusion processes.

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HUMIDITY INDICATOR
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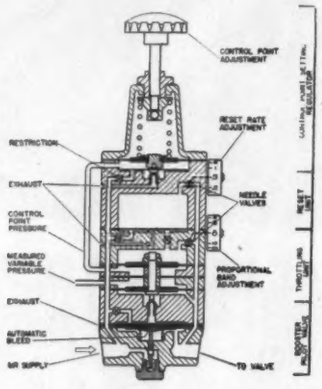
WESTON Instruments
Weston Electrical Instrument Corporation
617 Frelinghuysen Avenue, Newark 5, N. J.

Moore Nullmatic Controllers

A new line of automatic control instruments which operate on the pneumatic force-balance system, without the use of levers and linkages, was recently introduced by the Moore Products Co., H and Lycoming Streets, Philadelphia 24, Penna. They are suitable for temperature, pressure, flow, liquid level, specific gravity, and all control applications in which pneumatic transmitters can be used as primary elements.

The controller operates directly from the process transmitter, and sends an output pressure to the control valve without introducing frictional errors, with their resulting dead-spot and controller lag. Control action is completely independent of the operation of the



indicator or recorder, because these units are outside of the control circuit. Construction has been simplified to a remarkable degree. All of the components have been combined in a "stack" of interchangeable parts and diaphragms without complicated external piping.

The control-point setting is actually an air-pressure loading, a feature which completely eliminates mechanical linkages, and permits accurate adjustment. If remote control-point setting is required, the top section is eliminated, the second section is modified slightly, and a separate pressure regulator is located at the desired control station.

When desired, a separate diaphragm-type derivative unit, not illustrated, may be used to superimpose a rate action on the controller output. Either the throttling or the reset section can be removed when either of these functions is not required. The needle valves which provide these adjustments are of the spring-release type, removable as complete assemblies.

A reversing plate is included by which the measured-variable and the control-point pressures may be interchanged, in order to reverse the output pressure to the diaphragm valve. Calibrated gauges are furnished to show control-point setting, process measurement, valve pressure, and supply pressure.

Thwing-Albert Instrument Co., Philadelphia 44, Penna., has introduced the **Elmendorf Junior Tearing Tester** as a smaller running mate to the standard Elmendorf tester. The junior model has a capacity one-eighth that of the standard instrument. The total capacity is 200 grams, making it ideal for use on plastic films, tissues, lightweight paper, etc.

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—for dipped rubber gloves, including linemen's or electricians' gloves and surgeons' gloves. Some are made from our own stock molds and others from customers' molds.

Write today for our new catalog covering rubber glove and other forms for dipped rubber goods. Prompt attention given to requests for quotations based on your specifications or stock items.

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Has many advantages in rubber stocks

- ★ Resists heat and aging.
- ★ Little tendency to revert during long cures.
- ★ Resists flex cracking.
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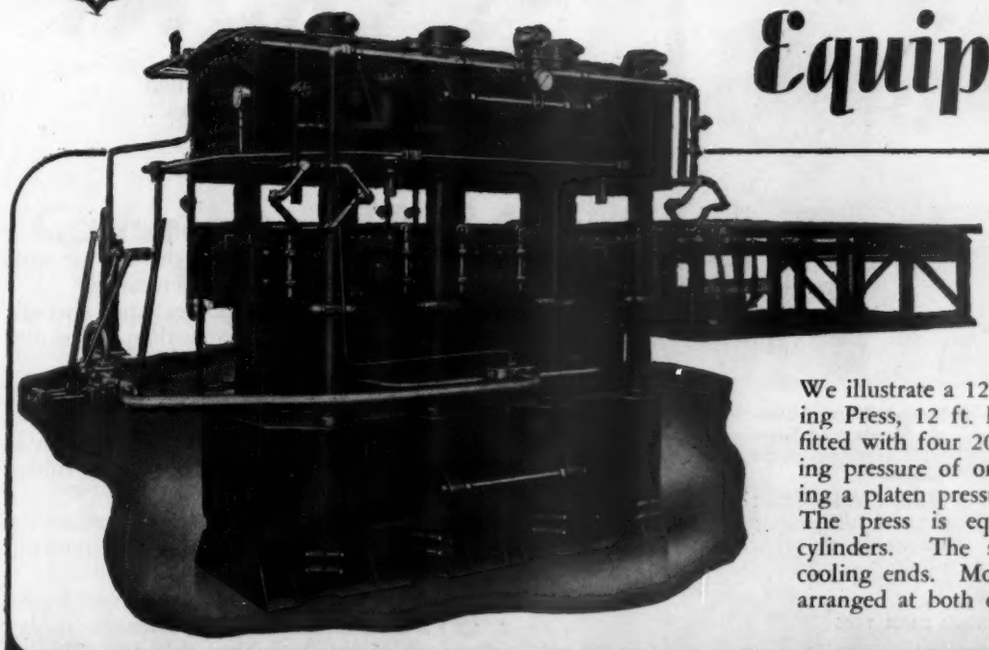
Hydraulic Vulcanizing Equipment



We illustrate a 1250 ton single daylight Sheeting Press, 12 ft. long by 3 ft. 6 inches wide, fitted with four 20″ rams, suitable for a working pressure of one ton per square inch, giving a platen pressure of 450 lbs. per sq. inch. The press is equipped with four opening cylinders. The steel steam chests have 9″ cooling ends. Motor driven drawtable can be arranged at both ends of the press if desired.

H 111

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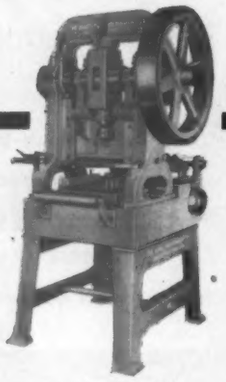
Rubber Cutting Machines with a Lifetime of Uniform Quality

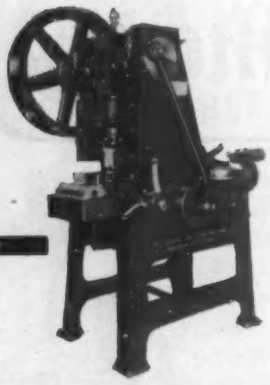
ENGINEERED TO MEET YOUR PARTICULAR REQUIREMENTS



MODEL A2

COULTER RUBBER CUTTING MACHINES have been used successfully for years and years in the cutting of continuous volumetric control and stripping for Heels, Soles, Taps and other molded products.

MODEL A1



- Model A1 for Heels at high speed production, or short runs.
- Model A2 for Multiple Heels, Half and Full Soles with stock grain.

MODEL A3

- Model A3 for Multiple Heels and Taps with or across stock grain.
- Model A2S (Not shown) for cutting crosswise of grain of stock.

PRODUCTION MACHINES SINCE 1896

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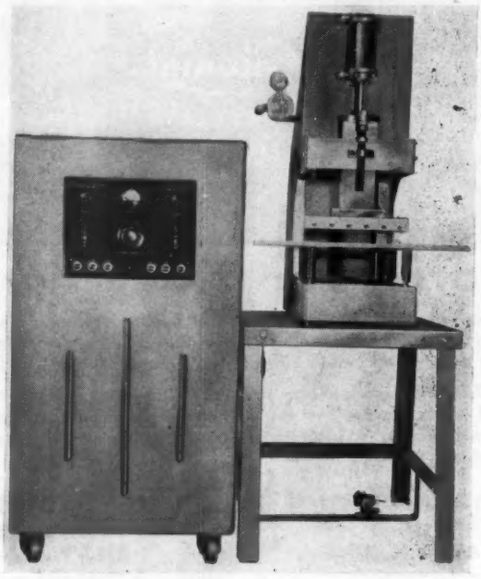
Kabar High Frequency Unit

A high frequency unit for heat sealing every thermoplastic with equal facility, including Vinylite, Geon, Koroseal, Saran and Krene is currently being marketed by the Kabar Manufacturing Corp., 100 West 42nd St., New York 18, N. Y. Called the Kabar-"X," the unit



is sold complete for immediate operation and can be installed without the loss of a single production hour. It is said to give permanent and flawless airtight seams in such items as belts, beachballs, tobacco pouches, baby pants, air pillows, life preservers, and a host of other products.

Bonding Nitrile Rubber to Steel

(Continued from Page 56)

Conclusions

The following conclusions were reached as a result of this work regarding the suitabilities of the cements tested for bonding Hycar OR-15 stocks to steel:

1. The proprietary chlorinated rubber and phenolic resin bonds are somewhat more reliable than the ordinary chlorinated rubber bonds.
2. Chlorinated rubber and phenolic resin bonds withstand aliphatic fuels equally well.
3. The phenolic resin bond withstands immersion in 40% aromatic fuels better than the chlorinated rubber bond.
4. The chlorinated rubber bond withstands immersion in boiling water somewhat better than the phenolic resin bond.
5. The phenolic resin bond withstands elevated temperatures better than the ordinary chlorinated rubber and proprietary chlorinated rubber bonds. This is particularly true for temperatures above 250°F.

LITERATURE CITED

(1) A.S.T.M. Standard Method of Test: D429-39.
(2) Merrill, J. A., *Rubber Age (N. Y.)*, Vol. 59, p. 313 (1946).

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Meticulous workmanship has been a tradition at Brockton Cutting Die for three generations. That's why rubber manufacturers turn to us for quality dies of all kinds . . . for dies that really retain their cutting edge. Our experience and facilities enable us to turn out a cutting die for every type of service.

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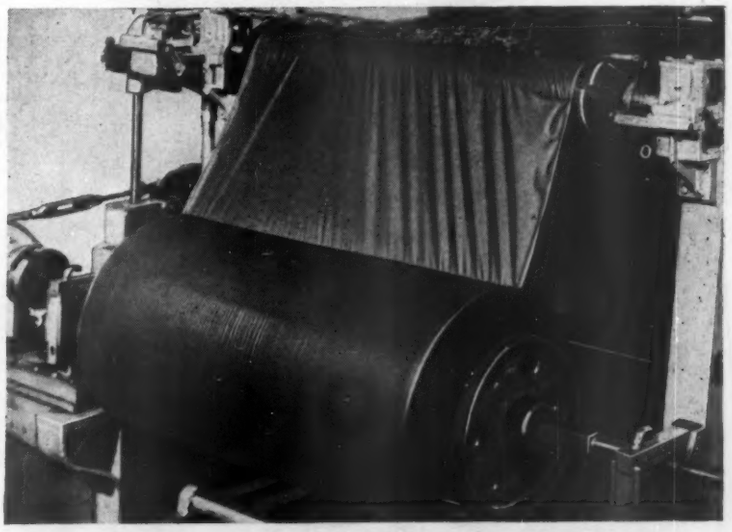
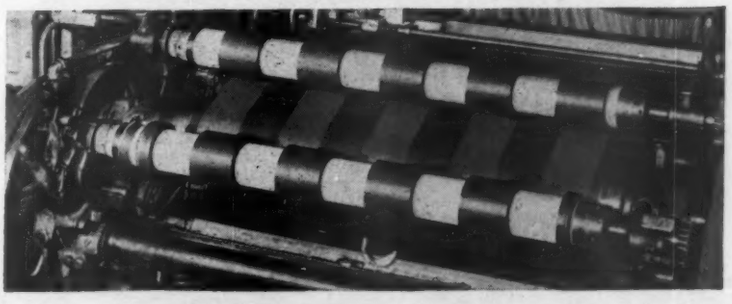


Below: using two rewind shafts for positive roll separation



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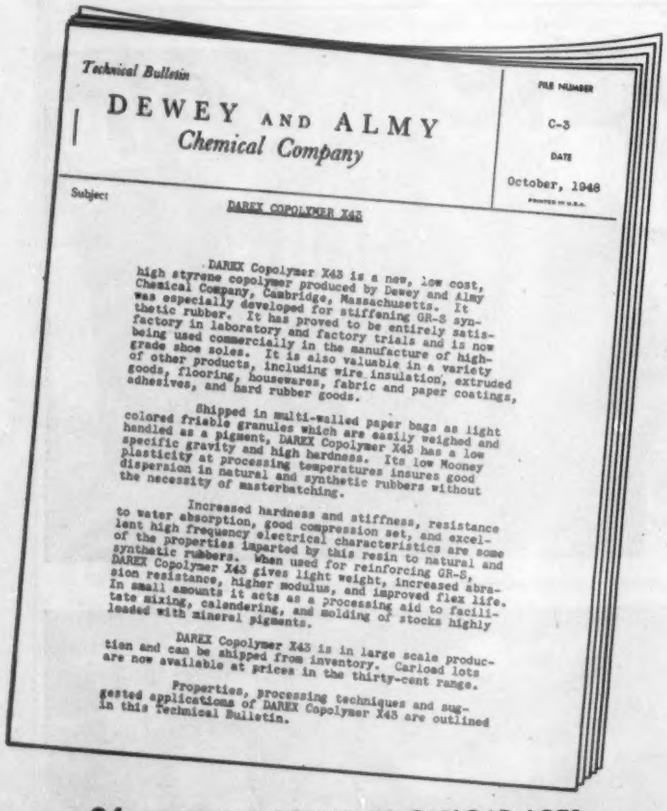
***DAREX COPOLYMER**

X43

WHAT IT IS: Darex Copolymer X43 is a light-colored, low density reinforcing agent for compounding Natural and Synthetic Rubbers to impart the properties you want.

HOW IT IS USED: It can be easily processed without master-batching to give stocks of low plasticity that extrude, calender and mold easily, that have low shrinkage, hot tear resistance and good embossing characteristics.

FULL TECHNICAL INFORMATION: If you make soling, flooring, housewares, thin-walled insulation, fabric or paper coatings or adhesives, etc., you should write for technical bulletin C-3. It gives all the technical information, properties and processing applications of Darex Copolymer X43. Write Department 89D, Dewey and Almy Chemical Company, Cambridge, Massachusetts.



Technical Bulletin

DEWEY AND ALMY
Chemical Company

FILE NUMBER
C-3
DATE
October, 1948

Subject
DAREX COPOLYMER X43

DAREX Copolymer X43 is a new, low cost, high styrene copolymer produced by Dewey and Almy Chemical Company, Cambridge, Massachusetts. It was especially developed for stiffening GR-S synthetic rubber. It has proved to be entirely satisfactory in laboratory and factory trials and is now being used commercially in the manufacture of high-grade shoe soles. It is also valuable in a variety of other products, including wire insulation, extruded goods, flooring, housewares, fabric and paper coatings, adhesives, and hard rubber goods.

Shipped in multi-walled paper bags as light colored friable granules which are easily weighed and handled as a pigment, DAREX Copolymer X43 has a low specific gravity and high hardness. Its low Mooney plasticity at processing temperatures insures good dispersion in natural and synthetic rubbers without the necessity of masterbatching.

Increased hardness and stiffness, resistance to water absorption, good compression set, and excellent high frequency electrical characteristics are some of the properties imparted by this resin to natural and synthetic rubbers. When used for reinforcing GR-S, DAREX Copolymer X43 gives light weight, increased abrasion resistance, higher modulus, and improved flex life. In small amounts it acts as a processing aid to facilitate mixing, calendering, and molding of stocks highly loaded with mineral pigments.

DAREX Copolymer X43 is in large scale production and can be shipped from inventory. Carload lots are now available at prices in the thirty-cent range.

Properties, processing techniques and suggested applications of DAREX Copolymer X43 are outlined in this Technical Bulletin.

36 CENTS PER POUND IN CARLOAD LOTS

T. M. REG. U. S. PAT. OFF.

DEWEY AND ALMY CHEMICAL COMPANY
CAMBRIDGE, MASSACHUSETTS

REVIEWS

Vanderbilt Rubber Handbook. (Ninth Edition, 1948). Edited by S. S. Rogers. Published by the R. T. Vanderbilt Co., 230 Park Ave., New York 17, N. Y. 5½ x 8½ in. 720 pp. $7.50.

Any one familiar with the earlier editions of the Vanderbilt Rubber Handbook—and who in the rubber industry is not?—will immediately recognize the new edition because it has the same cut of the title, tapped rubber tree, capital V, and shows the usual edges of different colored pages. The color of the cover is brown instead of green or maroon and the book is bulkier, being more than half again as thick, with 719 pages as compared with 464. This handbook is unique in the type and quantity of practical information on natural, synthetic and reclaimed rubbers and how to compound and test them. The different rubbers are described, the properties of their vulcanizates are outlined and the meanings of these properties are discussed.

There are chapters on the design of natural and synthetic rubber compounds, and on the commercial compounding of automobile tires and tubes, mechanical goods, insulated wire and cables, coated fabrics, footwear and hard rubber. Also, there are sections on the composition and compounding of natural and synthetic latices, the company's compounding materials, test methods and equipment, general articles and the very useful tables and charts. A new section on flexible plastics has been included.

In the foreword Dr. A. A. Somerville states that the principal changes appearing in this edition are:

"1. The compounding of various types of rubbers, natural and synthetic, is treated from the standpoint that general compounding is now a broader term than formerly because the number of basic raw materials available to the manufacturer has been increased by the advent of synthetics. The treatment of any one type of rubber, natural rubber, GR-S, or other, is considered as a particular aspect of the greater subject.

"2. Topics of general interest and test procedures which have changed considerably in recent years are covered in articles written by well informed men employed in various phases of the rubber industry."

Also, "It is to be admitted that our policy throughout the book is to place emphasis on the effective use of Vanderbilt materials for all types of compounding; we feel that our line of products is so broad and representative that we have been able to do so without limiting the scope or departing from the principles of practical compounding in any way."

No one can quarrel with this statement.

The book seems to bulge with good information on compounding and testing which is up-to-date and bears the mark of good experience.

All temperatures are given in both Fahrenheit and Centigrade degrees. The drawings are clear, the photographs are well reproduced, the chemical formulas of most of the compounding materials and the compositions of dispersions are given.

The nitrile rubbers are not mentioned as such, but always as Buna N rubbers. The index is good but in a book of this type could well have been expanded. The book has been proofread very carefully—no typographical errors were noted by the reviewer.

Like its predecessor, the book includes a map and directions for reaching the Vanderbilt laboratory in South Norwalk by auto from New York and vicinity.

The neophyte in rubber compounding will find in this handbook much to profit by and much that will lead him into good habits of thought and work, and even the more experienced rubber man will gain much from its use as a refresher course, not to say anything about its usefulness as a handy volume of easily accessible and valuable information.

H. L. FISHER

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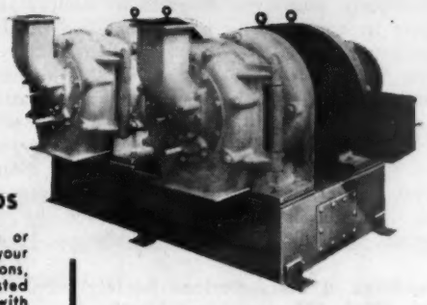

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Originators of Liner

the Capitol Process

Dunlop in War and Peace. By Sir Ronald Storrs. Published by Hutchinson & Co., Ltd., London, England. 5½ x 8½ in. 148 pp. 8s. 6d. (approximately $2.00).

The Dunlop Rubber Co. is a vast organization and its manufacturing processes are necessarily far flung over a diversity of units. It is almost impossible for the layman to appreciate this diversification and sometimes difficult for the company employee himself to understand the role he occupies in contributing to the finished product. This book is an attempt to present a unified picture of the total Dunlop job in the war, first for the men and women whose efforts made the work successful and then for the public at large. The book is replete with photographs and descriptions of dozens of military products manufactured by the company, oftentimes under the most difficult conditions. Normal peacetime operation of the company is also detailed. The book includes a preface by Sir J. George Beharrell, chairman of the company.

•

Proceedings of the American Society for Testing Materials: 1947. (Vol. 47). Published by the Society, 1916 Race St., Philadelphia 3, Penna. 6¼ x 9 in. 1198 pp.

This summary of proceedings of the fiftieth annual meeting of the A.S.T.M. held in Atlantic City, N. J., June 16-20, 1947, records the action taken on the Recommendations Affecting Standards and includes all committee reports. The Edgar Marburg Lecture on "Engineering Laminates" by W. C. Voss is reproduced, as are a number of technical papers delivered before various committees. Brief reference is also made to several special symposiums conducted by these committees, including the Symposium on Rubber Testing conducted by Committee D-11 on Rubber and Rubber-Like Products. The papers delivered at that symposium are available in a special booklet issued by the society.

•

Directory of New England Manufacturers: 1949. Published by the George D. Hall Co., 30 Kilby St., Boston 9, Mass. 8 x 11 in. 760 pp. $30.00.

This is the thirteenth annual edition of this comprehensive directory of manufacturers in the New England area, which is issued with the editorial cooperation of the New England Council. Like previous editions it contains an alphabetical section of manufacturers and their addresses, together with such supplementary data as officers, products, branch officers, number of employees, etc. Geographical and products sections are also included. All of the data has been revised and brought completely up-to-date. Information on New England as an industrial and marketing area is included.

FOR FURTHER DETAILS, SEE AD ON PAGE 4

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- ★ **Reduces Breakdown Cost**
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POLYSIZE 117-H

1. Permanent starching of cotton piece goods. On a dry basis, 117-H is many times more effective than starch in imparting firmness. Use Polysize 332 where smooth ironing is required.
2. Bodying, dulling, weighting and stiffening nylon, rayon and silk goods.
3. Launderproof and dry-cleaning proof permanent stiffener for cotton goods used as inserts for collars (including shirt collars) and lapels.

POLYSIZE 177

1. In combination with clays, talc and pigments, as a flexible filling and weighting finish for cotton, rayon and linen goods. Helps prevent dusting in brittle finishes.
2. As an extremely launderproof and dry-cleaning proof finish for rayon, nylon and cotton goods.
3. With non-permanent finishes such as starches or gums to give improved fastness.
4. As an addend to pigments for printed goods to reduce crocking. **Also available in harder and softer grades.**

POLYSIZE 220

1. Used alone or as a supplement to POLYSIZE 117-H for dulling nylon, rayon and silk.
2. Imparts dulling effect and a pearlescent sheen to rayon goods without rendering stiffness.

POLYSIZE 311

1. Flexible, non-chalking finish for ribbon stock. Imparts weight and excellent handle.
2. Slip-proof finish for nylon and rayon. Good dry-cleaning resistance.
3. Sprayed top-coat finish for woven paper goods (auto seat covers) to impart lustre.

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BOOKLETS, CATALOGS, etc.

Experiments on Tractor Tyre Performance. British Rubber Development Board, Market Buildings, Mark Lane, London E. C. 3, England. 7½ x 10 in. 24 pp.

This booklet represents the findings of a BRPRA committee as to the effectiveness of performance of wide-based tractor tires introduced by American manufacturers primarily as a war-time expedient to conserve rubber supplies. The experiments were carried out by the National Institute of Agricultural Engineering at Askham Bryan, near York, during the summer and autumn of 1947. The objects of the tests were: (a) to compare the drawbar performance of a tractor fitted with wide-base tires with that obtained on tires on narrow rims; (b) with wide base tires only, to determine the effect on drawbar performance of providing differing proportions of the same total back axle weight in the form of liquid ballast; and (c) if possible, to note whether the incidence of side-wall wrinkling at high deflections, with the wide-base tires, was affected by the proportion of liquid ballast used. Charts, tables and diagrams illustrate the test results.

•

Instruments for Treatment of Sewage and Industrial Wastes. (Bulletin No. 7301). Brown Instrument Co., Division of Minneapolis-Honeywell Regulator Co., Philadelphia 44, Penna. 8 x 10½ in. 48 pp.

Among the instruments described in this catalog are electric and mechanical flow and liquid level meters, pneumatic remote transmission systems, thermometers, pressure gauges, ElectroniK Recorders and Indicators, the Protectoglo Combustion Safeguard, Water Circulators, and others. The catalog is illustrated with photographs and dimensional drawings. Applications of the instruments as to sewage flow, bar screen automatic operation, aeration tanks, chemical flowing basins, digesters, heating water controls, and more are also presented.

•

Burrell Industro Gas Analyzers. (Bulletin No. 213). Burrell Technical Supply Co., 1942 Fifth Ave., Pittsburgh 19, Penna. 8½ x 11 in. 8 pp.

Two models of the company's gas analyzers for control analysis of gas mixtures such as carbon dioxide, carbon monoxide, methane, oxygen, hydrogen, and nitrogen are discussed and outlined in this bulletin. Operating procedures and structural features of the two models are outlined. The bulletin also lists and outlines various accessories used with the analyzers. Photographs and cutaway drawings are included.

•

Modern Die Casting Practice. By R. J. Reel. Hydraulic Press Manufacturing Co., Mount Gilead, Ohio. 8½ x 11 in. 24 pp.

Reprinted from an article which appeared in *Steel*, this pamphlet discusses in detail practical modern trends of application, various die casting methods, dies and die design, and machinery. The compositions and properties of various alloys for die casting such as aluminum, zinc, copper and magnesium are presented in tabular form. Photographs and schematic drawings are included.

•

Electric Heat Uniformly Controlled by Sta-Warm. Sta-Warm Electric Co., Ravenna, Ohio. 8½ x 11 in. 4 pp.

This bulletin discusses, in general terms, the company's electrically-heated melters, dispensers, and pouring equipment that find application in such operations as electrical parts manufacture, plastics, instrument making, battery construction, protective coating and dipping, and more. Photographs illustrate the different pieces of equipment. Charts and schematic drawings are included.

Parlon: Properties and Uses. Hercules Powder Co., Wilmington, Del. 8½ x 11 in. 44 pp.

A revised edition of a technical booklet previously published, this booklet contains considerable new information on the use of Parlon in protective coatings, printing inks, paper coatings, textile finishes, and many other applications. A section on finishes for alkaline surfaces includes photographs comparing the corrosion resistance of Parlon paint with other paints. Examples of acid and alkali-resistant starting formulas are also given. Charts showing how Parlon speeds the drying time of enamels, and photographs illustrating the results of drying-time tests, are also included.

•

Modernizing Manufacturing and Production Controls. (Production Series No. 173). American Management Association, 330 West 42nd St., New York 18, N. Y. 6 x 9 in., 56 pp. $1.00.

This pamphlet consists of five papers recently presented at a meeting of the American Management Association. Topics covered include (1) Production Control Through the Control of Materials; (2) Mechanizing Production Control Procedures; (3) Practical Applications of Quality Control Principles; (4) What's New in Materials Handling? Questions which were asked at the meeting are reproduced at the end of each paper, and the author's answers are given.

•

Color in Elastomer Compounds. By A. J. Northam and S. G. Byam. (Report No. 48-5). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9 in. 24 pp.

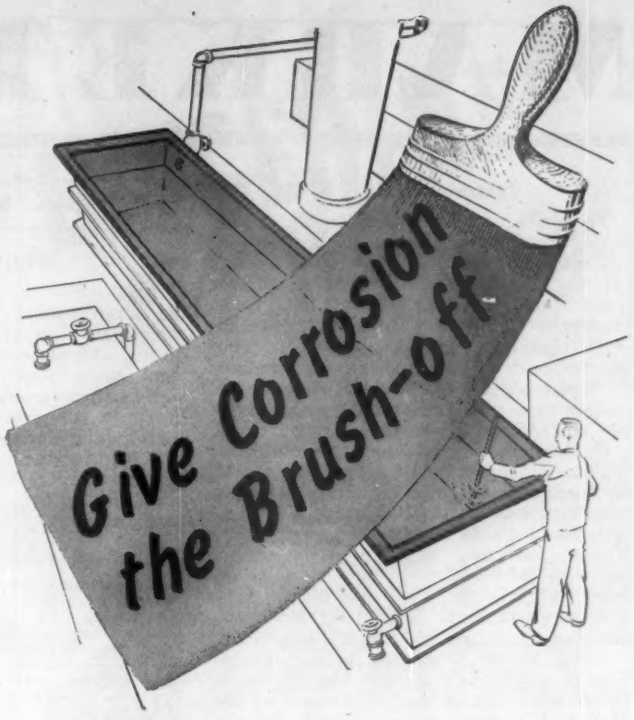
This report discusses and clarifies the various factors involved in selecting pigments (colors) for use in elastomers. Among the questions which the authors undertake to answer are: what factors affect color in elastomer compounds and what is necessary in pigment color for elastomers? Other than physical factors, such matters as economic considerations are discussed. Various types of colors are discussed, and charts and tables serve to outline the questions at hand.

•

Laurex in Natural Rubber. (Compounding Research Report No. 9). Naugatuck Chemical Division of U. S. Rubber Co., Rockefeller Center, New York 20, N. Y. 8½ x 11 in.

The advantages in using Laurex, a fatty acid activator and plasticizer, in natural rubber stocks are outlined in this technical report. The effect obtained when using the product in natural rubber tread stocks or with off-grade natural rubber as to modulus, tensile, elongation, etc., is presented in a series of tables.

FOR FURTHER DETAILS, SEE AD ON PAGE 4



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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, OCTOBER 7, 1948

Natural Rubber

The price of spot rubber on the Commodity Exchange has swung in a range of 1.37 cents since our last report (September 13), high for the period being 23.12 cents reached on September 16, and again on September 22, and low 21.75 cents reached on October 1, and again on October 4. The average price of spot rubber for the month of September was 22.81 cents based on 21 trading days. This compares with an average of 23.63 cents for August.

Production of crude natural rubber in Malaya in August continued at a high level despite numerous reports during the last month of widespread Malayan political disturbance. Cable advices received from Kuala Lumpur, said August output amounted to 56,602 long tons, a decline of but 2.7% from the 58,165 long tons in July and compares with 49,051 long tons produced in the region in August, 1947.

World stocks of natural rubber, exclusive of stocks held by the United States Government and by the Government of the United Kingdom, are estimated by the Secretariat of the Rubber Study Group at 792,500 tons (as of July 31). Stocks reported by members of industry in the United States were 128,800 tons, and stocks available to industry in other consuming countries (excluding Russia) 181,200 tons compared with 119,800 tons and 166,800 tons, respectively, at the end of June.

London has confirmed the report that Russia has offered to buy the Ceylon rubber output, but details are not yet arranged and may take some little time to conclude.

Today's quotations in the outside market, London and Singapore, follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.22½
November-December	.22⅜
January-March	.22
Thin Latex Crepe:	
Spot	.24
November-December	.24
Thin Brown Crepe, No. 2	.16⅝
Ambers, No. 3	.16½
Flat Bark Crepe	.11½

London Market

(Standard Smoked Sheets)

December	21.68 - 21.78
January-March	21.53 - 21.63

Singapore Market

(Standard Smoked Sheets)

October	20.12 - 20.22

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.390 - .415
Butaprene NL	.400 - .425
Butaprene NAA	.440 - .465
Butaprene NXM	.470 - .495
Chemigum 30 N4NS	.400 - .470
Chemigum 50 N4NS	.400 - .470
Chemigum N3	.450 - .520
Hycar OR-25	.400 - .425
Hycar OR-15	.470 - .495
Hycar OS-10	.400 - .425
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Neoprene Type NC	—— - .250
Perbunan 18	.430 - .450
Perbunan 26	.440 - .460
Perbunan 35	.510 - .530
Silastic (compounded)	.235 - .440
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

It was generally felt in trade circles that the scrap rubber market would recover somewhat from the lows it had reached during the summer months when many plants were closed for inventory purposes and vacation periods. As was the case last month, a complete recovery has not been forthcoming during September. Stabilization of foreign economies through the action of ERP was expected to have a stabilizing effect upon the market. Current quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$12.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton.	12.00
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06¼
Black passenger tubes	lb.	.03½
Mixed passenger tubes	lb.	.03¾
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.06
Black truck tubes	lb.	.03
Buffings	ton	15.00

Reclaimed Rubber

Preliminary estimates for consumption of reclaim during August was set at 22,441 tons compared with the 19,291 tons consumed in July. Consumption of reclaim for the first eight months of 1948 totaled 182,346 tons. The market generally assumed a firmer tone in August, after the seasonal slump which was felt during July. The price structure remained unchanged. Current quotations follow:

Tires			
Black, Acid	lb.	.08¾ @	.09¼
Black, Digester	lb.	.08 @	.08½
Peels	lb.	.09 @	.09½
GR-S Whole Tire	lb.	.08½ @	.09
Inner Tubes			
Black	lb.	.12¾ @	.13¼
Red	lb.	.13½ @	.14
GR-S	lb.	.09½ @	.10
Butyl	lb.	.08½ @	.09
Shoe			
Unwashed	lb.	.08¼ @	.08¾

Cotton Tire Fabrics

The general demand for cotton tire fabrics continues at fairly low levels. Trade circles are inclined to believe that the next few months will stabilize the discrepancies which now exist between the buyer's and the seller's markets. The price structure for cotton tire fabrics remains substantially the same with current quotations as follows:

Standard, Peeler, 12/4/2	lb.	.7600
Standard, Peeler, 14/4/2	lb.	.7800
Standard, Peeler, 16/4/3	lb.	.8050
Extra Staple, Peeler, 12/4/2	lb.	.8575
Extra Staple, Peeler, 14/4/2	lb.	.8775
Extra Staple, Peeler, 16/4/3	lb.	.9025

Chafers

14.4 oz. (per sq. yard)	lb.	.7550
9.25 oz. (per sq. yard)	lb.	.7125
11.65 oz. (per sq. yard)	lb.	.6850
8.9 oz. (per sq. yard)	lb.	.7275

Cotton

The price of middling uplands on the Cotton Exchange has swung in a 45 point range since our last report (September 13), high for the period being 32.40 cents on September 16, and low 31.95 cents on September 20. The average price of middling uplands for the month of September was 31.92 cents based on 23 trading days. This compares with an average of 32.23 cents in August.

Senator Elmer Thomas (Dem., Okla.), former Chairman of the Senate Agriculture Committee, stated recently that he would join with other cotton state senators early next year in an effort to get the Government's price support continued at 90% of parity after January 1, 1950.

Officials of the cotton branch of the Department of Agriculture are rushing to completion figures upon the prospective supply and demand next year for American raw cotton preliminary to a decision whether production control quotas upon cotton acreage will be recommended for 1949. Well grounded belief still prevails in authoritative circles that Secretary of Agriculture Charles P. Brannan will decide against quotas for next year.

The United States raw cotton trade may get another prop under prices soon. Officials in Washington are developing a plan through which Japan and western Germany may get as much as $150,000,000 of new capital to spend on textile fibers, mostly cotton.

Considering the heavy volume of hedges of late, and the rather large movement of cotton, the hedge selling in the futures market is regarded as light. Actual spot sales in the South continue to run sharply under last year, which is attributed to continued slow demand for cotton gray goods in the primary markets.

Quotations for middling uplands on the Exchange follow:

	Sept. 13	October 7		
	Close	High	Low	Close
October	31.11	31.65	31.52	31.63
December	30.80	31.24	31.16	31.21
March	30.64	31.08	31.01	31.06

Closing Rubber Prices on New York Commodity Exchange

FROM SEPTEMBER 14 TO OCTOBER 7

Date Sept.	Spot	Dec.	Mar.	May	July	Sales
14	22.88	21.25	21.15	21.15	21.05	11
15	23.00	21.10	21.30	21.30	21.20	33
16	23.12	21.55	21.42	21.40	21.30	32
17	23.00	21.35	21.20	21.12	21.08	13
18	——	——	——	——	——	——
19	——	——	——	——	——	——
20	23.00	21.59	21.48	21.47	21.37	35
21	23.00	21.50	21.40	21.40	21.30	26
22	23.12	21.64	21.45	21.43	21.33	4
23	23.00	21.45	21.30	21.28	21.18	22
24	22.50	21.25	21.26	21.18	21.08	27
25	——	——	——	——	——	——
26	——	——	——	——	——	——
27	22.62	21.25	21.15	21.13	21.03	17
28	22.88	21.55	21.40	21.38	21.28	30
29	22.75	21.50	21.35	21.33	21.33	24
30	22.75	21.40	21.25	21.10	21.00	46
Oct.						
1	21.75	21.70	21.50	21.30	21.20	49
2	——	——	——	——	——	——
3	——	——	——	——	——	——
4	21.75	21.59	21.37	21.20	21.10	21
5	22.62	21.39	21.30	21.10	21.00	2
6	22.62	21.45	21.25	21.10	21.00	25
7	22.50	21.60	21.43	21.22	21.12	30

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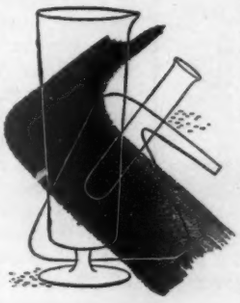
HIGH GRAVITY... A pale yellow industrial glycerine. Specific gravity, 1.262—15.5° C./15.5° C.

DYNAMITE... Made especially for the explosives trade. Specific gravity, 1.262—15.5° C./15.5° C.



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CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

OCTOBER 7, 1948

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

[a] East of Mississippi.

—The arrangement of this section follows closely the Chemical Section of the 1947 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.

—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.

—All requests for information or listings should be sent to Market Editor, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

ACCELERATORS

A-1	lb.	.34	- .39
A-10	lb.	.40	- .47
A-19	lb.	.52	- .58
A-32	lb.	.59	- .69
A-77	lb.	.42	- .55
A-100	lb.	.42	- .55
Accelerator No. 8 (dlvd.)	lb.	——	- .75
Accelerator No. 49	lb.	.44	- .45
Accelerator No. 89 (dlvd.)	lb.	——	- 1.20
Accelerator No. 122 (dlvd.)	lb.	——	- 1.30
Accelerator No. 552 (dlvd.)	lb.	——	- 1.63
Accelerator No. 808 (dlvd.)	lb.	.59	- .61
Accelerator No. 833 (dlvd.)	lb.	1.13	- 1.15
Acrin (dlvd.)	lb.	——	- .65
Altax	lb.	.35	- .37
Arazate	lb.	——	- 2.16
Beutene	lb.	.59	- .64
B-J-F	lb.	.27	- .32
Butasan	lb.	——	- 1.00
Butazate	lb.	——	- 1.00
Butyl Eight	lb.	1.00	- 1.05
Captax	lb.	.27	- .29
C-P-B	lb.	——	- 1.95
Cumate	lb.	——	- 1.45
Cuprax	lb.	.60	- .62
Dibenzo G-M-F	lb.	——	- 2.65
Diorthotolylguanidine (dlvd.)	lb.	.48	- .50
Diphenylguanidine (dlvd.)	lb.	.39	- .45
El-Sixty	lb.	.39	- .46
Ethasan	lb.	——	- 1.00
Ethazate	lb.	——	- 1.00
Ethyl Thiurad	lb.	——	- 1.00
Ethyl Tuex	lb.	——	- 1.00
Formaniline (dlvd.)	lb.	——	- .40
G-M-F	lb.	——	- 2.50
Good-rite Erie	lb.	.31	- .33
Guantal	lb.	.47	- .54
Hepteen	lb.	.42	- .48
Base	lb.	1.80	- 1.90
Ledate	lb.	——	- 1.00
Mercaptobenzothiazole	lb.	.27	- .32
Mercaptobenzothiazyl Disulfide	lb.	.35	- .40
Methasan	lb.	——	- 1.00
Methazate	lb.	——	- 1.00
Monex	lb.	——	- 1.10
Mono Thiurad	lb.	——	- 1.10
Morfex 33	lb.	.53	- .58
2-MT (dlvd.)	lb.	.58	- .60
Novac	lb.	——	- 1.40
A-13	lb.	.65	- .67
O-X-A-F	lb.	.34	- .39
Pentex	lb.	.74	- .84
Flour	lb.	.12¾	- .13¾
Phenex (tons)	lb.	——	- .40
Pipazate	lb.	——	- 1.53
Pip-Pip	lb.	——	- 1.63
R-2 Crystals	lb.	——	- 1.55
Rotax	lb.	.35	- .41
SA 52	lb.	——	- 1.10
SA 57	lb.	——	- 1.00
SA 62	lb.	——	- 1.00
SA 66	lb.	——	- 1.45
SA 67	lb.	——	- 1.00
SA 77	lb.	——	- 1.00
Safex	lb.	——	- 1.15
Santocure	lb.	.53	- .60
Selazate	lb.	——	- 1.45
Selenac (Ethyl, Methyl)	lb.	——	- 1.45
Setsit-5	lb.	.75	- 1.00
SPDX-GH (tons)	lb.	.64	- .69
Tellurac	lb.	——	- 1.45
Tepidone (dlvd.)	lb.	——	- .55
Tetrone (dlvd.)	lb.	——	- 1.25
A (dlvd.)	lb.	——	- 1.85
Thiocarbanilide (dlvd.)	lb.	——	- .34
Thiofide	lb.	.35	- .42
Thionex (dlvd.)	lb.	——	- 1.10
Thiotax	lb.	.27	- .34
Thiurad	lb.	——	- 1.10
Thiuram E (and M) (dlvd.)	lb.	1.00	- 1.10
Trimene	lb.	.54	- .64
Base	lb.	1.03	- 1.18
Triphenylguanidine (dlvd.)	lb.	——	- .83
Tuads (Ethyl, Methyl)	lb.	1.00	- 1.10
Tuex	lb.	——	- 1.10
Ultex (tons)	lb.	——	- 1.00
Unads	lb.	——	- 1.10
Ureka	lb.	.55	- .62
Blend B	lb.	.55	- .62
C	lb.	.52	- .59
Vitasan Crystals	lb.	.48	- .53
Vulcanex (dlvd.)	lb.	——	- .45
Z-B-X	lb.	——	- 2.45
Zenite (dlvd.)	lb.	.33	- .35
A (dlvd.)	lb.	.42	- .44
B (dlvd.)	lb.	.39	- .41
Zenite Special	lb.	.34	- .36
Zetax (coated)	lb.	.33	- .35
(uncoated)	lb.	.34	- .36
Zimate (Butyl, Ethyl)	lb.	——	- 1.00
Zimate, Methyl	lb.	——	- 1.00

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.15¼	- .15½
Fish Oil, Hydrogenated, Fatty Acid			
Hydrofol Acid (dlvd.)	lb.	.22¾	- .26¼
Hyfac 430 (dlvd.)	lb.	.23	- .24
Neo-Fat H.F.O. (dlvd.)	lb.	.27	- .28
Stearex Beads (dlvd.)	lb.	.28	- .29½
Lime, Hydrated			
Arrowhead	ton	16.00	- 19.50
Sierra	ton	16.00	- 19.50
Litharge			
Eagle (dlvd.)	lb.	.1925	- .2025
FBS (dlvd.)	lb.	.1935	- .2035
Magnesium Oxide, Heavy			
General Magnesite	lb.	.05½	- .08
Michigan No. 15	lb.	.0550	- .0600
Permanente	lb.	.05	- .06½
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	——	- .28
General Magnesite (Neoprene Grade)	lb.	——	- .28
General Magnesite No. 101	lb.	——	- .175
General Magnesite Standard	lb.	——	- .22
K & M (Neoprene Grade)	lb.	——	- .31
Maglite "M" (l.c.l.)	lb.	——	- .28
Marine's (Neoprene Grade (l.c.l.)	lb.	——	- .28
Michigan No. 30	lb.	——	- .22½
No. 40	lb.	——	- .2800
Witco Extra Light	lb.	.25	- .27
Oleic Acid			
Emersol 210 (dlvd.)	lb.	.19	- .21¼
L.C.P. Red Oil	lb.	.25½	- .27¼
Red Oil (20-24 Saponified) (dlvd.)	lb.	.30½	- .32¾
Palm Oil Fatty Acid (c.l.)	lb.	——	- .11

ACTIVATORS (Cont'd)

Potassium Oleate (drums)	lb.	——	- .29½
Red Lead			
No. 2 RM (dlvd.)	lb.	.2075	- .2175
Sodium Laurate (drums)	lb.	——	- .19
Sodium Oleate—Powder (drums)	lb.	——	- .35
Paste (drums)	lb.	——	- .20
Sodium Stearate—Powder (drums)	lb.	——	- .35
USP Grade (drums)	lb.	——	- .37
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.26	- .27
Stearex B (dlvd.)	lb.	.31½	- .32½
Stearic Acid, Double Pressed			
Alba (dlvd.)	lb.	.33¾	- .34¾
S-2-A (dlvd.)	lb.	.31½	- .32½
S-2-B (dlvd.)	lb.	.31	- .32
Stearic Acid, Other			
Neo-Fat 1-60 (dlvd.)	lb.	.29	- .30
Neo-Fat 1-65 (dlvd.)	lb.	.30	- .31
Stearite	cwt.	36.00	- 38.00
White Lead Carbonate (dlvd.)	lb.	.19	- .20
Zinc Laurate (c.l.)	lb.	——	- .29
Laurex	lb.	.32	- .35
Zinc Stearate	lb.	.51	- .52
Aquazinc	lb.	.20	- .35

Unclassified Activators

Actifat (dms.)	lb.	——	- .18
Acidex	lb.	.09	- .15
Aero Ac 50	lb.	.50	- .56
165	lb.	.37	- .39
Barak (dlvd.)	lb.	——	- .60
D-B-A	lb.	——	- 1.95
Delac J	lb.	.55	- .60
P	lb.	.45	- .52
Dibutylamine (l.c.l., dms.)	lb.	——	- .53½
Dutch Boy Normasal	lb.	——	- .43¼
Palmalene (drums)	lb.	——	- .15
Plastolein 9050 (dms.)	lb.	.55¼	- .57½
9055 (dms.)	lb.	.45¾	- .48
9058 (dms.)	lb.	.55¼	- .57½
9250 (dms.)	lb.	.35¼	- .37½
9715 (dms.)	lb.	.41¾	- .44
Polyac (dlvd.)	lb.	——	- 1.40
Ridacto (drums)	lb.	.22	- .24
Snodotte (dlvd.)	lb.	.24½	- .25½
SOAC (min. 10 dms.)	cwt.	——	- 10.00
SOAC-KL (min. 10 dms.)	cwt.	——	- 10.00

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	.02½	- .02¾
National (cyl., dlvd.)	lb.	.16	- .20
Aqua Ammonia (l.c.l., dms.)	lb.	.0285	- .0325
M.B.M. (l.c.l.)	lb.	——	- .35

ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	——	- .12
Regular	lb.	——	- .08½
D.C. Antifoam A	lb.	6.74	- 7.30

ANTI-OXIDANTS

Agerite Alba	lb.	2.20	- 2.30
Gel	lb.	.58	- .60
Hipar	lb.	.82	- .84
H. P.	lb.	.61	- .63
Powder	lb.	.46	- .48
Resin	lb.	.63	- .65
Resin D	lb.	.46	- .48
Stalite	lb.	.46	- .48
White	lb.	1.40	- 1.50
Akroflex C (dlvd.)	lb.	.58	- .60
Aminox	lb.	.46	- .55
Aranox	lb.	——	- 2.15
Benzoquinone	lb.	1.50	- 1.75
Betanox Special	lb.	.68	- .77
B-L-E	lb.	.46	- .55
Powder	lb.	.61	- .63
B-X-A	lb.	.43	- .45
Carvacrol	lb.	——	- .85
Chlorcarvacrol	lb.	——	- 2.45
Eugenol C-95%	lb.	——	- 1.28
Flectol H	lb.	.46	- .53
Flexamine	lb.	.61	- .70
Gallic Acid, Tech.	lb.	1.10	- 1.23
USP or NF	lb.	1.27	- 1.40
Hydroquinone	lb.	.90	- .90
Monomethylparaminophenol Sulfate	lb.	2.40	- 2.90
Neozone Standard (dlvd.)	lb.	.66	- .68
A (dlvd.)	lb.	.43	- .45
C (dlvd.)	lb.	.47	- .49
D (dlvd.)	lb.	.43	- .45

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ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	—	3.40
Parazone (dlvd.)	lb.	—	.68
PDA-10	lb.	.36	.38
Perflectol	lb.	.61	.68
Permalux (dlvd.)	lb.	1.53	1.55
Pyrogallic Acid, Resublimed	lb.	2.60	2.65
USP Crystals	lb.	2.10	2.15
Resorcin, Tech. (dlvd.)	lb.	—	.64
Santoflex B	lb.	.46	.53
BX	lb.	.57	.64
Santovar-A	lb.	1.30	1.37
Santowhite (crystals)	lb.	1.73	1.80
Santowhite MK	lb.	1.40	1.52
MKS	lb.	1.25	1.37
S.C.R. (tons)	lb.	.32	.34
Solux (dlvd.)	lb.	1.93	1.95
Stabilite (tons)	lb.	—	.46
Alba (tons)	lb.	—	.69
L (tons)	lb.	—	.48
Stabilizer No. 1	lb.	—	1.65
Stabilizer No. 320	lb.	—	.80
Tannic Acid, Tech.	lb.	.70	.79
Thermoflex (dlvd.)	lb.	1.48	1.50
A (dlvd.)	lb.	.76	.78
C (dlvd.)	lb.	.54	.56
Thymol	lb.	—	2.50
V-G-B	lb.	.55	.64

ANTI-SCORCHING AGENTS

Good-rite Vultrol	lb.	.55	.57
Retarder PD	lb.	—	.36
Retarder W (dlvd.)	lb.	—	.43
Sodium Acetate 60-62% Crystals	lb.	—	.05½

ANTISEPTICS AND GERMICIDES

Formaldehyde (barrels)	lb.	—	.062
G-4 (bbls.)	lb.	1.00	1.15
G-11	lb.	—	3.50
Methyl Para Hydroxy Benzoate	lb.	—	2.10
Nuodex 100 S.S. (dlvd.)	lb.	—	1.05
Nuodex 100 W.D. (dlvd.)	lb.	—	1.20
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	—	.2125
Ortho Cresol (26°-27°)	lb.	—	.18
Soligen Drier—Copper 8% (drums)	lb.	—	.22½
Zinc 8% (dms.)	lb.	—	.21¼
Vancide	lb.	—	.80

AROMATICS (DEODORANTS)

Bouquet 149	lb.	—	3.00
Coumarin	lb.	—	2.75
Curodex 19	lb.	—	4.75
188	lb.	—	5.75
198	lb.	—	6.75
D-6 Masking Perfume	lb.	—	1.35
Deodorant 65	lb.	—	1.00
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Latex Perfume 5	lb.	—	3.25
6	lb.	—	7.50
9	lb.	—	.65
Neutroleum Delta	lb.	—	2.40
Gamma	lb.	—	3.40
Parador A	lb.	—	2.25
C	lb.	—	3.25
E	lb.	—	.55
F	lb.	—	.47
I	lb.	—	2.00
K	lb.	—	.43
GD 5280	lb.	—	2.50
GD 5348	lb.	1.90	3.25
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Rodo No. 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbarome (dms.)	lb.	1.10	2.10
Rubber Perfume 12	lb.	—	1.90
Russian Leather 7	lb.	—	4.10
Vanillin	lb.	3.00	3.15

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.0640	.0975
Blowing Agent CP-975	lb.	—	.50
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	—	1.85
Sponge Paste	lb.	—	.20
Unicel (dlvd.)	lb.	—	.60
ND (dlvd.)	lb.	—	1.00
Urea	lb.	.0425	.0475

BONDING AGENTS

Durez 12987	lb.	.48	.53
Interlake Resin No. 4162	lb.	—	1.50
MDI	lb.	7.25	7.75
50	lb.	3.60	3.85
Pliobond 20	gal.	2.75	4.00
30	gal.	3.45	4.70
Reanite	gal.	6.75	7.25
Rex Compound 482	gal.	—	1.05
Ty-Ply Q (and S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	8.11	8.61
Glacial—99½% (bbls.)	cwt.	14.05	14.55
Calcium Nitrate, Tech., Crystals	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	—	.084
Zinc Nitrate, Tech.	lb.	—	.21½

COLORING AGENTS

Black

Carbon Black—See *Reinforcing Agents*			
Aquablak B (also M, R)	lb.	.08¼	.09¼
Aquablak S	lb.	.07¾	.08¾
Black Shield 4-35 (dms.)	lb.	—	.0825
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.0975	.1000
Raven Black Pure Iron Oxide	cwt.	10.75	11.00

Blue

Blue GD, Dispersed (dlvd.)	lb.	—	3.95
Paste (dlvd.)	lb.	—	1.80
Blue N (dlvd.)	lb.	—	.94½
Blue YD, Dispersed (dlvd.)	lb.	—	2.50
Milori Blue 11840 (dlvd.)	lb.	—	.45
Monastral Fast Blue CP (dlvd.)	lb.	—	3.85
PCD, Dispersed (dlvd.)	lb.	—	2.50
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	—	1.00
Stan-Tone Blue	lb.	1.40	4.00
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	1.00	2.45
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.1075	.12
Mapico Brown (50 lb. bags)	lb.	—	.1250

Green

Filo Green D-700 (and D-705)	lb.	—	.30
Green Chromium Oxide, Pure	cwt.	33.00	40.00
Green Chromium Oxide, Pure, Hydrated	cwt.	75.00	100.00
Green FD, Dispersed (dlvd.)	lb.	—	1.50
Monastral Fast Green GSD, Dispersed (dlvd.)	lb.	—	3.20
GSD Paste (dlvd.)	lb.	—	1.10
Permansa Green CP-594	lb.	—	1.35
Pigment Green B	lb.	—	1.35
GL-652D	lb.	.88	.93
Ramapo Green	lb.	—	4.00
Rubber Green X-1292	lb.	—	1.00
Stan-Tone Green	lb.	1.50	3.30
Utility Green	lb.	—	.30
Vansul Green M.B.	lb.	.85	2.40

Maroon

Stan-Tone Maroon	lb.	3.00	3.05
Vansul Maroon M.B.	lb.	1.05	2.80

Orange

Molybdate Orange	lb.	—	.41
Orange F (dlvd.)	lb.	—	3.65
FD, Dispersed (dlvd.)	lb.	—	2.75
Rubber Orange X-2065	lb.	—	2.60
Stan-Tone Orange	lb.	1.65	2.25
Vansul Orange M.B.	lb.	2.15	2.65

Red

Cadmium Red	lb.	.95	1.25
Cadmolith Red (bbls.)	lb.	1.10	1.35
Graphic Red (dlvd.)	lb.	—	.80
Indian Red, Pure	cwt.	11.50	11.75
Mapico Red 297 (50 lb. bags)	lb.	.1050	.1075
Oximony Iron Oxide	lb.	—	.09
Red Iron Oxide, Light	cwt.	11.50	11.75
Red PB (dlvd.)	lb.	—	1.90
PBD Dispersed (dlvd.)	lb.	—	1.65
2B (dlvd.)	lb.	—	1.75
2BD, Dispersed (dlvd.)	lb.	—	1.65
Rubanox Red CP-762 (dlvd.)	lb.	—	1.30
Rubber Red CP-339 (dlvd.)	lb.	—	1.05
Rubber Red RT-364	lb.	—	.75
Rubber Red RT-425	lb.	—	.75
Rubber Red X-1148	lb.	—	.80
Solfast Red CP-663 (dlvd.)	lb.	—	1.80
CP-787 (dlvd.)	lb.	—	1.30
Stan-Tone Red	lb.	1.10	3.05
Vansul Red M.B.	lb.	1.00	2.05
Watchung Red	lb.	—	1.90

White—Lithopone

Albalith	lb.	.06⅜	.06⅝
Astrolith	lb.	.06⅜	.06¾
Cryptone No. 19	lb.	.08¼	.08½
CB No. 21	lb.	.08	.08¼
Eagle	lb.	.06⅜	.06⅝
Permalith	lb.	.06	.06¼
Ponolith	lb.	.06⅜	.06¾
Sunolith	lb.	.06⅜	.06¾

White—Titanium Pigments

Rayox	lb.	.17½	.20½
Ti-Cal	lb.	.07	.07½
Ti-Pure	lb.	.20	.21
Titanox A—all grades (dlvd.)	lb.	.17½	.18
B-30 (dlvd.)	lb.	.07	.07½
C (dlvd.)	lb.	.06¾	.07¼
RA—all grades (dlvd.)	lb.	.19½	.20
RC-HT (dlvd.)	lb.	.06¾	.07¼
Zopaque	lb.	.17½	.18½

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 33, 44, 55)	lb.	.1350	.1375
Eagle	lb.	.1350	.1375
Horse Head Special	lb.	.1350	.1375
XX Red	lb.	.1350	.1375
Joxite	lb.	.1150	.1200
St. Joe Black Label	lb.	.1350	.1375
Green Label	lb.	.1350	.1375
Red Label	lb.	.1350	.1375

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1575	.1600
Eagle Green Seal	lb.	.1525	.1550
Eagle Red Seal	lb.	.1475	.1500
Eagle White Seal	lb.	.1575	.1600
Florence Green Seal	lb.	.1525	.1550
Red Seal	lb.	.1525	.1550
White Seal	lb.	.1575	.16
Kadox 25	lb.	.1575	.16
Kadox 15, 17 and 72	lb.	.1350	.1375
U. S. P. 12	lb.	.1675	.17

White—Zinc Sulfide

Cryptone ZS-800	lb.	.1350	.1375

Yellow

Anchor Brand Pure Iron Oxide	cwt.	9.00	9.25
Cadmolith Yellow (bbls.)	lb.	—	.85
Chrome Yellow	lb.	—	.2950
Chrome Yellow 12310	lb.	—	.2950
Ferrox	cwt.	7.50	8.50
Mapico Yellow (50 lb. bags)	lb.	.0825	.0850
Rubber Yellow X-1940	lb.	—	1.60
Stan-Tone Yellow	lb.	1.20	1.75
Toluidine Yellow	lb.	—	1.70
YL-556-D	lb.	—	.82
Oximony Iron Oxide	lb.	—	.06¾
Vansul Yellow M.B.	lb.	.85	1.00
Yellow G (dlvd.)	lb.	—	1.95
GD, Dispersed (dlvd.)	lb.	—	1.85
HN (dlvd.)	lb.	—	1.60
Zinc Yellow	lb.	—	.21

DISPERSING AGENTS

Agchem SA-19	lb.	—	.30
SA-20	lb.	—	.70
Aqualsol-AR 90%	lb.	—	.24¾
Beaconol 52	lb.	.60	.75
Darvan No. 1 (and No. 2)	lb.	.21	.30
Daxad 11 (21, 23)	lb.	.08	.35
Dilex	lb.	—	.32
Dispersaid	lb.	1.25	1.35
Halloid	lb.	.03¾	.09½
HornKem No. 1	gal.	—	1.60
No. 3G	gal.	—	1.75
No. 12	lb.	—	.17
Lomar PW	lb.	.18	.19
Marasperse CB	lb.	.11½	.15
N	lb.	.09	.10
Rubbex	lb.	—	.27½
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	—	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Triethanolamine (drums) (dlvd.)	lb.	.21½	.22½
Triton R-100	lb.	.15½	.25
Yelkin TT	lb.	—	.22
Zinsper	lb.	—	.15

EXTENDERS

Advagum 1098	lb.	—	.65
Bunaweld Polymer No. 780	lb.	—	.22
No. 5514	lb.	—	.30
D-92 (and D-93) (dms.)	lb.	—	.12
Extender 600	lb.	—	.208
PR-162 Latex (dms.)	gal.	1.00	1.60
Synprolac	lb.	—	.19
Synprowax	lb.	.16	.19
Vistanex	lb.	—	.32

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.15	.95
Lionite	lb.	.09¾	.90
Pumice	lb.	.03	.05
Aluminum Hydrate	lb.	—	.17
Aluminum Silicate			
Silical	ton	37.00	55.00
Marter White	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	77.00	85.00
Barytes			
No. 1 Floated, White	ton	33.10	44.55
No. 2 Floated, Unbleached	ton	31.10	41.95
No. 22 Barytes (c.l.)	ton	—	18.37
Foam A	ton	—	33.10
Bentonite (c.l.)	ton	—	11.00
SPV Volclay (c.l.)	ton	—	11.00

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Blanc Fixe	ton	72.50	-120.00
Calcium Carbonate			
Atomite (c.l.)	ton	——	- 30.00
B.I. White No. 1 (c.l.)	ton	——	- 7.50
B.I. White No. 2 (c.l.)	ton	——	- 7.00
Blue-Star XX	ton	——	- 15.00
Calcene T	ton	45.00	- 55.00
Camelwite	ton	——	- 30.00
Kalite (c.l.)	ton	——	- 40.00
Lesamite (c.l.)	ton	——	- 27.50
Lim-Cal (c.l.)	ton	——	- 12.50
Millical (c.l.)	ton	——	- 25.00
Multifex	ton	——	-105.00
Sierracal	ton	15.00	- 18.50
Super Multifex	ton	——	-145.00
Suspenso (c.l.)	ton	——	- 22.00
Swansdown (c.l.)	ton	——	- 20.00
Witcarb R (c.l.)	ton	——	-105.00
R-12 (c.l.)	ton	40.00	- 60.00
Calcium Silicate			
Silene EF	ton	110.00	-120.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	——	- 18.00
Calcium Sulfate, Hydrous			
Crysta-Cal (c.l.)	ton	——	- 12.50
Terra Alba No. 1	ton	12.00	- 14.40
Chalk Whiting (l.c.l.)	lb.	.0150	- .0175
Recco Paris Whiting	ton	——	- 27.00
Clay			
Alsite (c.l.)	ton	——	- 13.00
Aluminum Flake	ton	16.50	- 60.00
A.S.P. No. 1 (c.l.)	ton	——	- 35.00
No. 11 (c.l.)	ton	——	- 40.00
Buca (c.l.)	ton	——	- 44.00
Catalpo (c.l.)	ton	——	- 33.00
Champion	ton	——	- 13.00
C.S.D. (c.l.)	ton	——	- 12.00
Crown	ton	——	- 13.00
Dixie (c.l.)	ton	——	- 13.00
Hi-White R	ton	——	- 15.00
Hydratex R	ton	28.00	- 45.00
Kaolloid Clay (c.l.)	ton	——	- 10.50
Markham (c.l.)	ton	——	- 13.00
McNamee (c.l.)	ton	——	- 12.50
Oldham (c.l.)	ton	——	- 13.00
Paragon	ton	12.50	- 30.50
Recco (c.l.)	ton	——	- 13.00
Stellar-R	ton	——	- 50.00
Suprex	ton	13.00	- 31.00
Upton	ton	19.50	- 21.00
Whitetex (c.l.)	ton	——	- 50.00
Witco No. 1 (c.l.)	ton	13.00	- 33.00
No. 2 (c.l.)	ton	13.00	- 33.00
Diatomaceous Earth	ton	30.00	- 50.00
Kaylorite (c.l.)	ton	——	- 30.00
Dolomite (c.l.)	ton	11.00	- 12.00
Flock			
Cotton	lb.	.08½	- .20
Filfloc F 40-9000	lb.	——	- .16
Filfloc F 6000	lb.	——	- .22
Rayon, bleached or dyed	lb.	.85	- 1.50
Rayon, grey	lb.	——	- .18
Solka-Floc (l.c.l.)	lb.	.05	- .15
Wool, bleached or dyed	lb.	.70	- 1.00
Glue, Bone (dlvd.)	lb.	.16½	- .18½
Graphite	lb.	.05	- .20
Ground Glass (l.c.l.)	lb.	.04	- .06
Leather, Shredded	lb.	.05	- .17
Lignin	lb.	.03	- .06
Indulin	lb.	——	- .09
Limestone, Pulverized	ton	3.25	- 10.00
Micro Velva	ton	45.00	- 47.00
Velvet Filler, Regular	ton	20.00	- 22.00
Magnesium Carbonate	lb.	.09	- .10
Clearcarb	lb.	.10¾	- .11¼
K & M	lb.	.1175	- .1225
Magnesium Oxide	lb.	.05	- .06
Magnesium Silicate	ton	18.00	- 35.00
Airex	ton	22.50	- 23.50
Asbestol	ton	20.00	- 22.00
Blue Star Talc	ton	——	- 23.00
L.S. Silver	ton	24.50	- 26.50
Sierra White	ton	21.25	- 23.25
Mica	lb.	.01¼	- .07¾
Concord	lb.	.0675	- .0750
Micro-Mica	lb.	.06¾	- .07½
Mineralite (c.l.)	ton	30.00	- 40.00
Silversheen	lb.	.06¾	- .07½
Triple A Mica (c.l.)	ton	——	- 25.00
Wet Ground Biotite Mica	lb.	.05½	- .06¼
Wet Ground Mica No. 160	lb.	.06¾	- .07½
Mineral Black			
Keystone 126	ton	——	- 13.00
Pyrophyllite			
Pyrax A (c.l.)	ton	——	- 12.50
WA (c.l.)	ton	——	- 14.00
Silica	ton	16.00	- 27.00
Blue Star	ton	——	- 21.50
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Talc, Domestic	ton	9.00	- 20.00
Walnut Shell Flour	ton	38.00	- 80.00
Whiting, Commercial	ton	8.00	- 20.00
Cameline (c.l.)	ton	8.50	- 10.00
C-C-O White	ton	——	- 16.00
Keystone (c.l.)	ton	——	- 16.00
Rambo No. 1 White	ton	——	- 9.00
Snowflake (c.l.)	ton	——	- 18.00
Veroc (c.l.)	ton	——	- 8.50
Welco (c.l.)	ton	——	- 8.50
York White (c.l.)	ton	——	- 9.00
Wood Flour	ton	20.00	- 62.18

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	1.05	- 1.35
Black Out	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.65	- .85
VanWax	gal.	1.25	- 1.30

FLAME RETARDANTS

Celluflex 179C (dms.)	lb.	——	- .39
Chlorinated Paraffin	lb.	.10	- .25
Halowax	lb.	.22	- .37
Zinc Borate 3167	lb.	.12	- .16¾
Zyrox	lb.	.65	- .79

LUBRICANTS, MOLD

Aquadag	lb.	3.15	- 3.45
Aquarex BBX Conc. (dlvd.)	lb.	——	- .78
D (dlvd.)	lb.	——	- .76
L Paste (dlvd.)	lb.	——	- .85
MDL Paste (dlvd.)	lb.	——	- .30
Borax, Granular (l.c.l.)	ton	70.00	- 80.00
Colite Concentrate (dms.)	gal.	——	- .90
Concentrex	lb.	——	- .20
D.C. Emulsion No. 35	lb.	2.20	- 3.50
D.C. Mold Release Fluid	lb.	5.20	- 6.00
Dipex	lb.	.14	- .18
Dri-Lube	lb.	——	- .18
Erlen Mold Lubricant	gal.	1.25	- 1.50
Glycerized Lubricant	gal.	——	- 1.85
Glydag	lb.	1.30	- 2.00
Kokobace	lb.	——	- .12
Latex-Lube (dlvd.)	lb.	——	- .22¾
Liqui-Lube (dlvd.)	lb.	——	- .16¾
Lubrex	lb.	.25	- .30
Migralube	lb.	——	- .30
Moldeze No. 1	gal.	——	- 36.00
No. 3	gal.	——	- 7.50
Mold Lubricant No. 72 Conc.	gal.	1.26	- 2.75
Mold-Slick	lb.	.202	- .215
Orvus WA Paste (dms.)	lb.	——	- .25
Prodag	lb.	.25	- .38
Redotex Flakes (dlvd.)	lb.	.18⅞	- .19½
Powder (dlvd.)	lb.	.19⅜	- .20
Rubber-Flo	gal.	——	- 1.15
Rubber-Glo	gal.	——	- .94
Rusco Mold Paste	lb.	——	- .18
Sericite (l.c.l.)	ton	65.00	- 75.00
Thermalube	lb.	——	- .11
Ulco Mold Soap	lb.	.16	- .29
Werkrite Flakes (dlvd.)	lb.	.15⅜	- .16
Powder (dlvd.)	lb.	.16⅜	- .17

LUBRICANTS, RUBBER

Propylene Stearate (drums)	lb.	——	- .40
Rubberol	lb.	——	- .3150

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.48	- .49
Calcium Stearate	lb.	.45	- .47
Polyethylene Glycol	lb.	.25	- .26
Rexanol A	lb.	——	- .11
Separex A	lb.	——	- .15
Zinc Stearate	lb.	.48	- .49

MOLD CLEANERS

Actusol (dlvd.)	gal.	——	- 1.45
Metso 99	cwt.	3.05	- 4.45
Granular	cwt.	2.50	- 3.55
Rubber-Sol	gal.	——	- 2.75
Shelblast	ton	80.00	-140.00
Sodium Silicate	cwt.	.80	- 1.40
Sprex A.C. (dlvd.)	lb.	——	- .15½

PEPTIZING AGENTS

Peptizer P-12	lb.	.84	- .90

PLASTICIZERS & SOFTENERS

AA (drums)	lb.	——	- .23
Acto 500	lb.	——	- .09
Adipol BCA (dms.)	lb.	.44½	- .45
Amalgamator 2-4	lb.	——	- .30
American Pine Tar	gal.	.34½	- .45½
Arolene 1980 (c.l.)	lb.	——	- .10
2286	lb.	——	- .25
2553 (c.l., dms.)	lb.	——	- .13
Bardol	lb.	.02¾	- .03¾
B	lb.	.05½	- .05¾
Bayol D	gal.	.29½	- .31½
F	gal.	.46	- .49
Beeswax, Refined & Bleached	lb.	.64	- .74
Yellow Refined	lb.	.63½	- .68
Bondogen	lb.	.55	- .60
B.R.C. No. 20	lb.	.0125	- .0135
B.R.H. 2	lb.	.02	- .029
BRS 700	lb.	.0175	- .026
B.R.T. 3	lb.	.024	- .025
4	lb.	.0225	- .0235
7	lb.	.0265	- .0275
B.R.V.	lb.	.0325	- .04
Bunarex Resins	lb.	.06	- .0750
Bunatak M	lb.	——	- .20
O	lb.	——	- .18
R	lb.	——	- .14
U	lb.	——	- .15
No. 21	lb.	——	- .08
No. 90	lb.	——	- .08
No. 865	lb.	——	- .17
No. 1080	lb.	——	- .09½

PLASTICIZERS & SOFTENERS (Cont'd)

Burgundy Pitch	lb.	.1026	- .1050
Butac	lb.	.11	- .12
Butyl Benzyl Sebacate	lb.	——	- .67
Butyl Carbitol Perlargonate (dms.)	lb.	——	- .645
Butyl Cellosolve Perlargonate (dms.)	lb.	——	- .68
Butyl Palmitate	lb.	——	- .26¾
Butyl Roleate	lb.	.176	- .18
Butyl Stearate	lb.	——	- .465
BWH-1	lb.	——	- .14
Califlux 510, 550	lb.	.025	- .0325
G.P.	lb.	.0125	- .02
R-100	lb.	.05	- .0575
Campol (t.c.)	ton	——	- 42.00
Candelilla Wax Prime	lb.	.67	- .75
Capryl Benzyl Sebacate	lb.	——	- .68
Carbonex	lb.	.0325	- .0375
S Flakes	lb.	.0475	- .0525
S Plastic	lb.	.046	- .051
644	lb.	.0375	- .04
Carbowax 4000 (drums)	lb.	.31	- .32
Cardolite 615	lb.	.37	- .40
816	lb.	.25½	- .28½
5858	lb.	.42	- .46
Carnauba Wax, Crude	lb.	.70	- .75
Refined	lb.	.85	- .90
Substitute	lb.	.45	- 1.08
Yellow	lb.	1.20	- 1.25
Ceresine Wax	lb.	.15	- .20
Contogum	lb.	.06¾	- .10¼
Cumar Resins	lb.	.05½	- .14½
D.B.M.	lb.	——	- .30
Degras, Common	lb.	.10	- .14
Diamylphenol (l.c.l., dms.)	lb.	——	- .28
Dibenzyl Sebacate	lb.	——	- .76
Dibutoxethyl Sebacate	lb.	——	- .625
Dibutyl Phthalate	lb.	.36	- .385
Dibutyl Sebacate—Tech.	lb.	——	- .67
C.P.	lb.	——	- .69
Dicapryl Adipate	lb.	——	- .40
Dicapryl Phthalate	lb.	——	- .45
Dicapryl Sebacate	lb.	——	- .645
Di-Carbitol Phthalate (dms.)	lb.	.39½	- .40
Dicyclohexyl Phthalate	lb.	——	- .43
Dielex	lb.	.0625	- .0650
Diethyl Phthalate (t.c.)	lb.	.31½	- .38½
Dihexyl Adipate	lb.	——	- .36
Dihexyl Phthalate	lb.	——	- .35
Dihexyl Sebacate	lb.	——	- .49
Di Isobutyl Azelate (dms.)	lb.	——	- .715
Dimethyl Phthalate	lb.	——	- .28
Dimethyl Sebacate	lb.	——	- .715
Dinopol (dms.)	lb.	.50½	- .51
Dioctyl Phthalate (dms.)	lb.	.43½	- .44
Dipolymer Oil	gal.	.33	- .38
Dispersing Oil No. 10	lb.	.0525	- .055
Dutrex A (B, 5, 6)	lb.	.02½	- .03¾
15	gal.	.10	- .189
20, 21, 25	lb.	——	- .03
ELA (dlvd.)	lb.	——	- .80
Estac	lb.	——	- .16
Ethox (dms.)	lb.	.4250	- .43
Flexol DOP	lb.	——	- .433
TOF	lb.	——	- .475
3GH	lb.	——	- .475
3GO	lb.	——	- .53
4GO	lb.	——	- .435
G. B. Light Process Oil	lb.	.025	- .0325
H-70	lb.	.56¾	- .64½
Hercolyn (dlvd.)	lb.	.1675	- .1725
Herron-H.T.	gal.	.2400	- .2700
Herron-Plas	lb.	.0350	- .0375
Herron-Wax	lb.	.0500	- .0550
HT-300	lb.	.45¾	- .53
Indonex 632½ (633½, 634½, 638½)	gal.	.1200	- .1700
VG (dlvd.)	lb.	——	- .07
Indopol H-300 (bbls.)	gal.	1.28	- 1.32
JMH	lb.	——	- .65
KP 23 (dms.)	lb.	.49½	- .50
KP 23 (dms.)	lb.	.49½	- .50
70 (dms.)	lb.	.41½	- .42
120 (dms.)	lb.	.44½	- .45
140 (dms.)	lb.	.49½	- .50
150 (dms.)	lb.	.44½	- .45
Kronisol (drums)	lb.	.40	- .40½
Kronitex (drums)	lb.	.37½	- .38
Lanolin, Tech. Anhydrous	lb.	——	- .19
Lead Oleate	lb.	.16½	- .42
Lindol (drums)	lb.	——	- .38
2-Mercaptoethanol (drums)	lb.	——	- .75
Methox (dms.)	lb.	.41	- .41½
Methyl Oleate	lb.	——	- .20
Methyl Stearate	lb.	——	- .70
Monoplex DBS	lb.	.90	- .91
Monoplex DOS	lb.	.84	- .85
5 (dms.)	lb.	.98	- 1.00
11 (dms.)	lb.	.50	- .51
16 (dms.)	lb.	.45	- .46
Montan Substitute No. 506	lb.	.425	- .435
Montan Wax, Crude	lb.	.50	- .55
Monten Wax (c.l.)	lb.	.52	- .55
Monty Wax	lb.	——	- .35
Natac	lb.	.1050	- .1150
Neolene 210 (t.c.)	lb.	——	- .16
212 (t.c.)	lb.	——	- .14
220 (t.c.)	lb.	——	- .15
Nerium	lb.	——	- .09
Nevillac Resins (dms.)	lb.	.23	- .45
Neville Resins (dms.)	lb.	.10	- .15½
Nevindene Resins (dms.)	lb.	.12½	- .15½
Nevinol (dms.)	lb.	——	- .17

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PLASTICIZERS & SOFTENERS (Cont'd)

Nevoil	lb.	.0325	.0425
Nevtex 10 (dms.)	lb.	——	.10½
Nuba 1 (and 2) (dms.)	lb.	——	.04
3X (dms.)	lb.	——	.065
15 (and 30) Oil (dms.)	lb.	——	.25
781 Oil (dms.)	lb.	——	.28½
No. 480 Oil Proof Resin	lb.	——	.15
Ohopex Q10 (dms.)	lb.	.435	.44
Opalwax	lb.	.37	.38
Ortho-Nitrobiphenyl	lb.	.06	.11
Ozokerite Wax No. 64 White	lb.	.31	.32
Yellow	lb.	.25	.26
P-1 (and 4, 6, 8, 20)	lb.	.30	.35
P-75	lb.	.66	.72
Pale 4 (and 1000)	lb.	——	.25
Palm Oil	lb.	——	.11
Paradene Resins (dms.)	lb.	.065	.075
Para Flux (dms.)	gal.	.1875	.1975
2016 (l.c.l.)	gal.	.22	.23
Para Lube (l.c.l.)	lb.	.046	.048
Paraplex G-25	lb.	.90	.91
G-40	lb.	.48¾	.49¾
Parmo	lb.	.06	.13½
Pentalene 90 (l.c.l., dms.)	lb.	——	.245
92 (l.c.l., drums)	lb.	——	.26
Pentaphen No. 114 (l.c.l., bags)	lb.	——	.27
Pepton 22	lb.	.72	.75
PG-16 (drums)	lb.	——	.34
Philplast No. 1	gal.	.18	.35
No. 2	gal.	.13	.35
Picco 10 (and 25)	lb.	——	.12
75 (and 100)	lb.	——	.11½
S.O.S.	gal.	.29	.34
Piccocizer 30	lb.	.05½	.06
Piccolastic A (and B, C, D, E)	lb.	.22	.22½
F	lb.	.139	.144
Piccolyte S Resins	lb.	.1500	.1575
Piccoumaron Resins	lb.	.06½	.14½
Piccovar	lb.	.12	.12½
Piccovol	lb.	.02½	.04
Pictar	gal.	.25	.30
Plas-Blend 360	lb.	.03	.04
Plastac M	lb.	——	.09¼
Plasticizer No. 50B	lb.	.365	.385
Plasticizer FP-6	lb.	——	.65
Plasticizer SC	lb.	.50	.52
Plasticizer VA-1	lb.	——	.40
Plasticizer XP-3	lb.	——	.50
Plastoflex 50	lb.	——	.38
J-21	lb.	——	.41
Plastogen	lb.	.07¾	.08
Plastolein X-55 (dms.)	lb.	——	.60
X-148 (dms.)	lb.	——	.70
Plastone	lb.	.27	.30
Polymel D	lb.	——	.20
Polymel Liquid	gal.	.12	.17
Polymel Resins	lb.	.029	.05
Process Oil C-255	gal.	——	.22
PT 400 Pine tar (600, 800) (t.c., dms.)	gal.	.34½	.45½
Refrigerator Oil 145-R	gal.	——	1.25
Reogen	lb.	.11¾	.12
465 Resin (drums)	lb.	——	.0575
Resin 731	lb.	——	.13¾
Resin C	lb.	.02	.0275
Resinex	lb.	.03¼	.04
L-4	lb.	.02¼	.03
Ridbo 369 (drums)	lb.	.08	.09
369-F (drums)	lb.	——	.12
Rosin Oil	gal.	.54	1.20
R.P.A. No. 2 (dlvd.)	lb.	——	.65
No. 3 (dlvd.)	lb.	——	.46
No. 5 (dlvd.)	lb.	——	.57
R.S.O. Softening Oil	lb.	.03	.05
Rubtar	gal.	——	.40
Santicizer B-16	lb.	.50	.57
E-15	lb.	.47	.54
M-17	lb.	.44	.51
No. 140	lb.	.31	.38
Softener No. 20	gal.	.09	.25
S.P.C.	lb.	——	.19½
Stanolind Petrolatum	lb.	.037	.081
Wax	lb.	.25	.30
Staybelite Resin (dms.)	lb.	——	.11
Sunny South Burgundy Pitch	cwt.	10.51	10.75
Sunny South Pine Tar	gal.	.34½	.45½
Sunny South Rosin Oil	gal.	.50	.67¾
Superla Wax	lb.	.25	.30
Syncera Wax	lb.	.175	.225
Synplasticizer	lb.	——	.10
Syn Tac (c.l.)	gal.	——	.33
Synthol	lb.	——	.2550
Tar, Refined	gal.	.12	.17
K-Tarnel NR (t.c.)	lb.	——	.0851
Terpene A	gal.	——	.65
TP-90B (and TP-95)	lb.	.55	.65
TP98	lb.	——	.50
Triacetin	lb.	.34	.45
Tricresyl Phosphate	lb.	.31	.33½
Turgum S	lb.	.09½	.10½
Vandiset A	gal.	.13	.20
Vanadiset B, C, D	lb.	.021	.055
Pulverized	lb.	.08½	.31
Solution	gal.	.40	.65
Vistac No. 1	gal.	——	1.32
No. 2	gal.	——	1.66
No. 4	gal.	——	1.80
Witresin—Granular	ton	41.00	43.00
Solid	ton	36.00	38.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	——	.17¼
Refined (drums)	lb.	——	.15¾
Castorwax (min. 400 lbs.)	lb.	——	.34
Dutrex 7	lb.	.02½	.03¾
30	gal.	.24	.27
ELA (dlvd.)	lb.	——	.80
Heron S.P.O.	lb.	.22	.23
Resin No. 510	lb.	——	.19

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾	.21
Agchem SA-9 (to SA-12)	lb.	.65	1.02
Alpha Protein	lb.	.28	.32
Aroostoocrat	lb.	——	.07½
Carob Bean Flour	lb.	.42	.50
Casein	lb.	.29	.37
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.20	.50
Prosein	lb.	.071	.09
Rex Compound No. 2801	lb.	——	.15
Sodium Alginate	lb.	——	1.50
Stablex B	lb.	——	.95
Tragacanth Flakes	lb.	.60	1.35

RECLAIMING AGENTS

1-D Heavy Oil (drums)	lb.	.0450	.0550
No. 517 H.B. Oil	gal.	.11½	.16½
535	gal.	.22	.27
C-6 Oil (and 28, 32)	gal.	.33	.38
C-10 Oil	gal.	.25	.30
C-33 Oil	gal.	.20	.25
Caustic Soda—Flake 76% (c.l., drums)	cwt.	——	3.25
Liquid 50% (t.c.)	cwt.	——	2.25
Solid 76% (c.l., dms.)	cwt.	2.50	2.85
Cresylic Acid (99-100%)	gal.	1.55	1.69
D-4	gal.	.23	.28
E-5	gal.	.21	.26
G. B. Reclaiming Oil	gal.	.12	.18
Heavy Aromatic Naphtha (t.c.)	gal.	——	8.25
LX-77 Reclaiming Solvent	gal.	.15	.21
LX-572 Reclaiming Oil	gal.	.23	.28
PT 67 Light pine oil	gal.	.60	.70
PT 101 Pine tar oil	gal.	.32	.43
PT 150 Pine solvent	gal.	.44	.45
Q Oil	gal.	.246	.296
Reclaiming Oil 1621	lb.	.03	.04
Reclaiming Oil 3186	gal.	——	.26
Reclaiming Oil 3186-G	gal.	——	.26
Reclaiming Reagent No. 4	lb.	.12	.15
Reclaiming Resin No. 1	gal.	.15	.35
R.P.A. No. 3 (dlvd.)	lb.	——	.46
Soda Ash (c.l., bags)	cwt.	——	1.20
Solvent 534	gal.	.22	.27
Solvent Oil 21	gal.	.24	.29
C-42	gal.	.27	.32
X-1 Resinous Oil	lb.	.0175	.0250
X-60 Solvent	gal.	.24	.32

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98	lb.	.0732	.1175
Continental F	lb.	.0732	.1125
Croflex	lb.	.0732	.1125
Crow	lb.	.0732	.1125
Dixiedensed (and S)	lb.	.0732	.1125
Kosmobile (andS)	lb.	.0732	.1125
Kosmos T	lb.	.0732	.1125
Micronex HPC	lb.	.0732	.1125
Spheron 4	lb.	.0732	.1170
Witco Disperso No. 6	lb.	.0732	.1125

Channel, Medium Processing (MPC) (bags)

Atlantic MPC-95	lb.	.0732	.1175
Continental A	lb.	.0732	.1125
Croflex TH	lb.	.0732	.1125
Dixie R-1	lb.	.0732	.1125
Dixiedensed HM (and S-66)	lb.	.0732	.1125
Huber Arrow TX	lb.	.0732	.1150
Kosmobile HM (and S-66, SMG)	lb.	.0732	.1125
Kosmos M	lb.	.0732	.1125
Micronex Standard	lb.	.0732	.1125
Spheron 6	lb.	.0732	.1170
Texas M	lb.	.0732	.1125
Witco Disperso No. 1	lb.	.0732	.1125

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42	lb.	.0732	.1175
Continental AA	lb.	.0732	.1125
Croflex 77	lb.	.0732	.1125
Dixiedensed 77	lb.	.0732	.1125
Kosmobile 77	lb.	.0732	.1125
Micronex W-6	lb.	.0732	.1125
Spheron 9	lb.	.0732	.1170
Texas E	lb.	.0732	.1125
Witco Disperso No. 12	lb.	.0732	.1125
Wyex	lb.	.0732	.1150

Channel, Conductive (CC) (bags)

Dixie 5 dustless	lb.	.0732	.1125
Kosmink dustless	lb.	.0732	.1125
Spheron C	lb.	.1200	.1600
Spheron I	lb.	.1000	.1400
Spheron N	lb.	.2200	.2500
Voltex	lb.	.1500	.1850

Furnace, Fast Extruding (FEF) (bags)

Statex M	lb.	.0550	.0950

Furnace, High Modulus (HMF) (bags)

Continex HMF	lb.	.0500	.0900
Dixie 40	lb.	.0500	.0900
50	lb.	.0550	.0950
Kosmos 40	lb.	.0500	.0900
50	lb.	.0550	.0950
Modulex	lb.	.0500	.0900
Philblack A	lb.	.0550	.0950
Statex 93	lb.	.0500	.0900
Sterling L	lb.	.0500	.0900
Sterling SO	lb.	.0550	.0950

Furnace, Reinforcing (RF) (bags)

Kosmos 60	lb.	.0732	.1150

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0350	.0750
Dixie 20	lb.	.0350	.0750
Essex	lb.	.0350	.0750
Furnex	lb.	.0350	.0750
Gastex	lb.	.0350	.0750
Kosmos 20	lb.	.0350	.0750
Pelletex	lb.	.0350	.0750
Seminex	lb.	.0350	.0750
Sterling NS	lb.	.0350	.0750
Sterling R	lb.	.0350	.0750
Sterling S	lb.	.0350	.0750

Furnace, Fine (FF) (bags)

Statex B	lb.	.0575	.0975
Sterling 99	lb.	.0650	.1050

Furnace, High Abrasion (HAF) (bags)

Philblack O	lb.	.0732	.1132
Vulcan	lb.	.0732	.1170

Furnace, Very Fine (VFF) (bags)

Statex K	lb.	.0732	.1125
Sterling 105	lb.	.0732	.1170

Thermal, Fine (FT) bags)

P-33	lb.	——	.0500

Thermal, Medium (MT) (bags)

Thermax (c.l.)	lb.	——	.0300

REINFORCING AGENTS—MISCELLANEOUS

Darex Copoylmer No. 3 (and X34)	lb.	.35	.37
No. X43	lb.	.36	.38
Darex Copolymer Latex No. 3 (and X34)	lb.	.36½	.50
Durez 12687 (and 12707)	lb.	——	.32
Durez 13355	lb.	——	.26
Marbon B	lb.	.65	.75
S and S-1	lb.	.36	.43
Marmix	lb.	.36	.43
Pliolite S6 Resin	lb.	.36	.37
G Masterbatch	lb.	.35	.36
G50 Masterbatch	lb.	.35	.36
R Masterbatch	lb.	.38	.39
Polyco 220	lb.	.13	.15

RETARDERS

ESEN	lb.	.34	.39
Retardex	lb.	——	.51

RUBBER SUBSTITUTES

Mineral Rubber

38	ton	26.00	32.50
Black Diamond	ton	26.00	27.50
Byerlyte	ton	42.50	57.50
Gilsonite, Selects (c.l.)	ton	33.50	34.50
Hard Hydrocarbon (dms.)	ton	42.00	44.00
Herron Flake	ton	47.50	48.50
Mineral Rubber, solid	ton	41.60	43.00
Parmr (drums)	ton	26.00	30.00
Pioneer	ton	33.00	60.00

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.337	.416
Brown	lb.	.153	.3335
Dispersed	lb.	.275	.490
Neophax	lb.	.190	.356
White	lb.	.144	.351

Miscellaneous Rubber Substitutes

Gilsowax	lb.	.04½	.05
Insulac	lb.	.06	.06½
Resin No. 1098 (drums)	lb.	——	.65
No. 1198	lb.	.31	.35

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- Has repulsion-induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

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2. Can also be used advantageously with Natural Rubber and Neoprene
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4. Improves the following:
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   - Chemical Resistance
   - Toughness
   - Abrasion
   - Heat Resistance
   - Mechanical Properties

Also

1. SYNVARITE RC Resins and Solutions for Rubber Cements and Adhesives
   - Excellent Solvent Release
2. Liquid Resins, SYNVAROL AND SYNVAREN, compatible with Synthetic and Natural Latices for Cements and Adhesives

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SYNVAR CORPORATION

WILMINGTON 99, DELAWARE

SOLVENTS

Acetone (dlvd.)	lb.	.08½	.10½
American Dipentene	gal.	.38	.39
Amsco Lactol Spirits (t.c.)	gal.	——	.16
Rubber Solvent (t.c.)	gal.	——	.15
Solv A (t.c.)	gal.	——	.22
Solv B (t.c.)	gal.	——	.26
Special Napthalite (t.c.)	gal.	——	.15
Textile Spirits (t.c.)	gal.	——	.16
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	——	.08
Benzol 90%	gal.	.17	.24
Butyl Acetate (t.c.)	lb.	——	.175
Butyl Alcohol (t.c.)	lb.	——	.175
Secondary (dlvd.)	lb.	.10½	.12½
Tertiary (dlvd.)	lb.	.12	.14
Carbon Bisulfide, Tech.	lb.	.05	.08
Carbon Tetrachloride	gal.	——	.80
Cosol 1	gal.	.30	.38
Cosol 2	gal.	.30	.38
Cyclohexane	lb.	.095	.11
Cyclohexanone	lb.	.25	.27 [a]
Diacetone, Pure (dlvd.)	lb.	.12	.14
Dichlorethyl Ether (dms.)	lb.	.165	.17
Formal (dms.)	lb.	.265	.27
Dichloropentane (l.c.l.)	lb.	——	.04½
Dipentene 122 (dms.)	gal.	——	.39
Ethyl Alcohol (t.c.)	gal.	——	.96
Ethylene Dichloride (drums, dlvd.)	lb.	.08	.09½
Halowax Oil	lb.	.22	.37
Heptanes (t.c.)	gal.	——	.15
Hexalin Cyclohexanol	lb.	.20	.22 [a]
Hexanes (t.c.)	gal.	——	.15⅜
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.45	.57½
Ether, Ref. (dlvd.)	lb.	.04½	.06½
Mesityl Oxide (dlvd.)	lb.	.1350	.1850
Methanol (dms., dlvd.)	gal.	.28	.475
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.615	.65
Methyl n-Amyl Ketone (drums)	lb.	.37	.39
Methyl Ethyl Ketone	lb.	.10	.12½
Methyl Isobutyl Ketone (dlvd.)	lb.	.14	.145
N-5 Pentane Mix. (t.c.)	gal.	——	.11½
N-6 Hexanes (t.c.)	gal.	——	.14
N-7 Hexanes (t.c.)	gal.	——	.13
Petrolene (t.c.)	gal.	——	.10⅛
Picolines, Aplha, Refined	lb.	.75	1.00
Mixed	lb.	——	.45
Pyridine, Refined	lb.	.80	.89
Quinoline	lb.	.50	.60
Rubber Solvent (t.c.)	gal.	——	.12½
Rubsol (t.c.)	gal.	——	.08625
Skellysolve B (Hexanes) (t.c.)	gal.	——	.141
C (Heptanes) (t.c.)	gal.	——	.133
E (Octanes) (t.c.)	gal.	——	.155
R (Solvent Naphtha)	gal.	——	.109
Solvenol	gal.	——	.39
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100 (t.c.)	gal.	——	.2812
150 (t.c.)	gal.	——	.2812
Sunny South Dipentene	gal.	.38	.39
Toluene (drums)	gal.	——	.28
Toluol (t.c.)	gal.	——	.23
Trichlorethane	lb.	.11	.12
Triglycol Dichloride (dms.)	lb.	.519	.59
Tromex	lb.	.078	.083
X-7 Sp. Heptanes (t.c.)	gal.	——	.11
Xylene (drums)	gal.	——	.28

STABILIZING AGENTS (for Vinyl Resins)

Dutch Boy DS-207	lb.	——	.54
Plumb-O-Sil A	lb.	——	.28¾
Tribase	lb.	——	.26¼
Eagle Basic Silicate White Lead	lb.	.21	.22¾
Lead Stearate, Precip.	lb.	.55	.57
Fused	lb.	.60	.62
Lithium Stearate	lb.	.75	.77
Stabelan A	lb.	.55	.65
Stabilizer V-7939	lb.	——	.60
Stabilizer JCX	lb.	.49	.51
SN	lb.	——	.42
V-1-N	lb.	.44	.50
V-9	lb.	——	.85
Vanstay	lb.	.33	.35

SUN CHECKING AGENTS

Antisol	lb.	.25	.26
Heliozone (dlvd.)	lb.	.25	.26
Sunproof	lb.	.25	.30
Jr.	lb.	.18	.23
Tonox	lb.	.50	.59

TACKIFIERS

Advaresin 100	lb.	.13½	.14
Agchem RC 30	gal.	.65	1.34
Amberol ST-137X	lb.	.33	.33½
Beckopol 1400 (dlvd.)	lb.	.2650	.27
Dutrex 44	gal.	——	.919
E-310 Resin Emulsion	lb.	——	.14
Galex (drums)	lb.	.1325	.1725
Koresin	lb.	.46	.58
Lindol Emulsion (drums)	lb.	——	.38
Liquid Rubber Flux	lb.	——	.125
Pentalyn Resins (dlvd.)	lb.	.19½	.22½
Resin V	lb.	——	.23¼
Rubtack	lb.	——	.12
Staybelite Esters (dlvd.)	lb.	.2100	.2150
Super-Beckacite No. 1001 (dlvd.)	lb.	.34	.34½
Tackifier 493-49B	lb.	.15	.17
700-25A	lb.	.14	.16
U2-24	lb.	.11	.13
Vistac No. 1	gal.	——	1.32
No. 2	gal.	——	1.66
No. 4	gal.	——	1.80

THICKENERS (FOR LATEX)

Acrysol GS	lb.	.14½	.22
Betanol (drums)	lb.	——	.70
Emulsorex No. 5	lb.	——	.35
Polyco 296	lb.	.13	.15
Propylene Laurate (dms.)	lb.	——	.36
Sodium Silicate	lb.	.01	.02

VULCANIZING AGENTS

Selenium

Vandex	lb.	——	2.00

Sulfur

Blackbird	cwt.	——	2.05
Crystex (l.c.l.)	lb.	.19½	.23
Dispersed Sulfur	lb.	——	.09
No. 2	lb.	.10	.15
Devil (c.l.)	cwt.	——	1.35
Insoluble Sulfur 60	lb.	.13	.13½
Spider	cwt.	——	2.05
Star (c.l.)	cwt.	——	1.85
Tire	cwt.	1.50	2.00
Tube (c.l., dlvd.)	cwt.	2.00	2.60

Tellurium

Latex Telloy	lb.	——	2.00
Telloy	lb.	——	2.00

Miscellaneous Vulcanizing Agents

VA-3	lb.	.55	.65
Vultac No. 1	lb.	.38	.45
No. 2	lb.	.38	.45
No. 3	lb.	.42	.49

WASHING & FINISHING AGENTS

Apcolene (t.c.)	gal.	——	.09⅝

WETTING AGENTS

Advawet No. 10	lb.	——	.35
No. 15	lb.	——	.18
No. 33	lb.	.40	.43
Aerosol OT 70% Clear	lb.	.80	1.00
Agchem SA-15 (16, 18)	lb.	.17	.29
Alrosol (dms.)	gal.	——	.48
Aquarex ME (dlvd.)	lb.	——	.92
NNS (dlvd.)	lb.	——	.60
NS (dlvd.)	lb.	——	.75
Areskap 50	lb.	.30	.38
Dry 100	lb.	.60	.72
Aresket 240	lb.	.30	.38
Dry 300	lb.	.60	.72
Aresklene 375	lb.	.42	.57
Dry 400	lb.	.70	.84
Lecithin	lb.	——	.22
Santomerse D	lb.	.43	.65
S	lb.	.12	.25
Sorbit P	lb.	——	.28
Stablex G	lb.	——	.70
Triton K-60	lb.	.33½	.41
N-100	lb.	.59½	.67
R-100	lb.	.14½	.25
720	lb.	.30½	.38
770	lb.	.21¾	.29¼
Vultamol	lb.	——	.17½

MISCELLANEOUS CHEMICALS

Acto 450 (550-W, 600, 630)	lb.	.109	.145
Agchem SA-17	lb.	——	.29
Aquarex SMO (dlvd.)	lb.	——	.50
A.S.T.M. Oil No. 1 (and No. 3)	gal.	1.00	1.15
Copper Inhibitor X-872-L	lb.	——	1.75
2-Ethylhexanol (dms., dlvd.)	lb.	.25	.26
Glycerine, 88% Sap., Crude (dlvd.)	lb.	.35½	.36
MODX (tons)	lb.	——	.29½
Para Resin No. 1784	lb.	——	.09¾
No. 2457 (c.l.)	lb.	——	.04
No. 2718 (c.l.)	lb.	——	.04
pHR	lb.	——	2.00
Pigmented Filmite	lb.	——	.16½
Polyvinyl Methyl Ether	lb.	——	1.00
Reference Fluid SR-6	gal.	.85	1.00
SR-10	gal.	.60	.75
Resin No. 1226	lb.	.31½	.36½
Resorcinol (dlvd.)	lb.	——	.64
Rio Resin	lb.	.50	.52
Santocel	lb.	——	.50
Sublac	lb.	.31	.34
Synpep N (drums)	lb.	——	.54
Thiokol LP-2	lb.	——	.90
LP-3	lb.	——	.90
Tysonite	lb.	.21½	.22¼
Vanfre	gal.	2.00	2.50
Vinsol Resin—Lumps	lb.	——	.06

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WATERGROUND WHITE and BIOTITE MICAS — Used for over 40 years in the Rubber Industry
THE ENGLISH MICA COMPANY
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FLAT FACE
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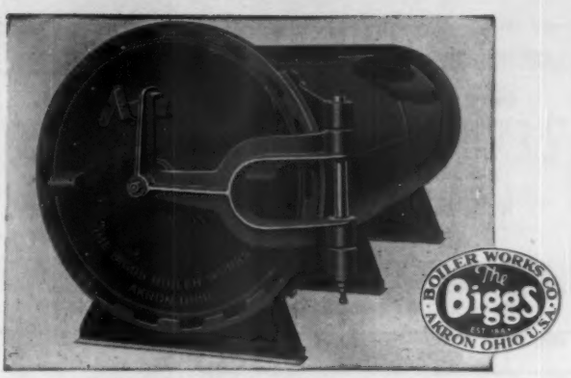

Fig. 17. Welded steam-jacketed, staybolt-less, horizontal vulcanizer with quick-opening door. All sizes; various working pressures. Low maintenance.

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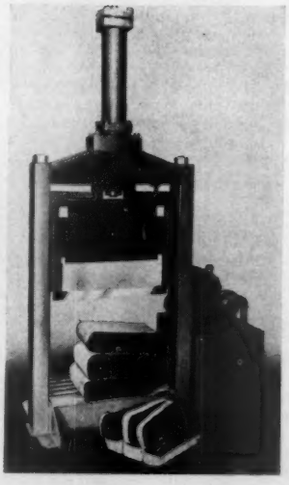

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RUBBER AND LATEX CHEMIST with eighteen years of research and factory experience wants to work with progressive organization in plant or technical sales, domestic or foreign travel. Speaks several languages fluently. Ph.D. Good appearance and personality. Single. Address Box 103C, RUBBER AGE.

RUBBER AND THERMOPLASTIC MATERIALS CHEMIST: Seven years' experience in compounding rubber, synthetic rubber, and thermoplastic resins for wire and cable; two and one-half years' experience in latex compounding and processing for dipped and molded products. Prefer Chief Chemist with a small progressive firm. Address Box 106C, RUBBER AGE.

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Consulting Technical Director of leading company for the past seven years will be available shortly due to reorganization. Textiles, papers, and metals. Rubbers, resins, lacquers, and colors.

Production or Development
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Address Box 241P, RUBBER AGE

RUBBER CHEMIST, six years' experience as Chief Chemist; compounding, processing mechanical rubber goods including paper mill rolls, medium sized plant. Age thirty-eight, married, college degrees. Would like management, technical superintendent, sales; $7,500 minimum. Address Box 250P, RUBBER AGE.

LATEX SPECIALIST seeks position. Twenty years' experience, also development and production control. Any location. Permanent. Address Box 257P, RUBBER AGE.

LATEX FOAM RUBBER CHEMIST—B.S. in Chemical Engineering. Experienced in development of latex foam compounds and equipment; some experience in GR-S production. Eastern location preferred; not essential. Address Box 258P, RUBBER AGE.

MATURE SCIENTIST with experience desires industrial position as executive, consultant, or director of research. Excellent training and references. Address Box 259P, RUBBER AGE.

ADHESIVE CHEMIST, B.S. Diversified experience in solvent and latex rubber-based adsesives, resins, binders, etc. Administrative experience. Age thirty-seven; single. Address Box 260P, RUBBER AGE.

TECHNICAL SALES AND DEVELOPMENT. Chemical Engineer, twenty-eight, five years' extensive experience in product development, sales, research of water emulsions and solvent solutions of synthetic, natural, reclaimed rubbers, vinyl polymers for adhesives, coatings, saturants, binders, dipped goods, desires responsible position. Address Box 261P, RUBBER AGE.

PLANT MANAGER, technically trained, sales minded, cost conscious, aggressive, with twenty-five years of experience in molded goods of all types, including heels and soles, plastic molding and sheeting, tire design and production. Address Box 263P, RUBBER AGE.

TECHNOLOGIST. Compounding and factory processing. Thirty years' practical experience in general rubber working. Address Box 264P, RUBBER AGE.

CHEMIST, M.S., 1941. Seven years' experience compounding and processing natural rubber, vinylite, and all types of synthetic rubber for molded, extruded, and calendered products. New England location with a small or medium sized company preferred. Address Box 267P, RUBBER AGE.

PRODUCTION FOREMAN with fifteen years' mill room and press room experience in manufacture of housewares, sponge and mechanical goods, desires position with small progressive firm with future. Address Box 271P, RUBBER AGE.

POSITIONS WANTED (Continued)

HOSE DEVELOPMENT AND PRODUCTION MAN with broad experience covering manufacture of braided, woven, knitted, and machine built hose along with extruded rubber products. Well versed in operation of all hose machinery and all type tubers. Address Box 272P, RUBBER AGE.

HELP WANTED

PRESSROOM FOREMAN for sponge and solid rubber molding. Vicinity of Chicago. Must be able to take full charge. State salary expected and experience. Address Box 230W, RUBBER AGE.

RESEARCH CHEMIST wanted in mill manufacturing latex impregnated papers. Experience in latex compounding or paper impregnation essential. Only top quality applicants will be considered. State qualifications and minimum salary acceptable. Address Box 232W, RUBBER AGE.

TECHNICAL SUPERINTENDENT for latex dipping and molded products. With established manufacturer on Eastern seaboard. Must be entirely familiar and have extensive experience in latex dipping and blown gas ball production. Good opportunity for right party. Write in detail past experience and salary expected. All replies will be kept confidential. Address Box 235W, RUBBER AGE.

PROCESS CHEMIST, experienced in rubber compounding and production of dipped items. Right man will eventually run rubber production of Michigan firm prominent in its field. Salary commensurate with ability. Our employees know of this advertisement. Address Box 256W, RUBBER AGE.

SUPERINTENDENT-CHEMIST for small rubber plant. Experienced in compounding, production, and supervision. Address Box 262W, RUBBER AGE.

SALESMEN WANTED: Midwest rubber plant, manufacturing mechanical and sponge rubber products, has open territories for salesmen calling on the industrial trade. Commission basis. State qualifications and background in reply. Address Box 266W, RUBBER AGE.

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(Rubber Experience)
We need top grade men for positions demanding sound experience. Right salaries to the right men! Confidential service.
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See! Write or wire
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WANTED: Hydraulic Presses, with Pumps and Accumulators, Banbury Mixers, Mills, Calenders, Tubers, any condition. Address Box 268E, RUBBER AGE.

WANTED

Machine to granulate slabs of plastic insulating materials. Capacity 300 to 500 Lbs. per hour.

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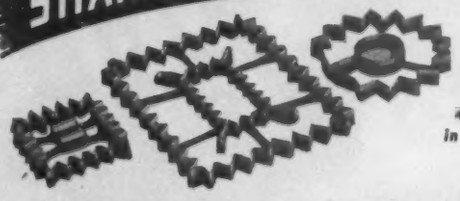

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